The Mining Journal

Established 1835 — Railway & Commercial Gazette

Vol. CCXLII No. 6186 — LONDON, MARCH 12, 1954 — PRICE 8d

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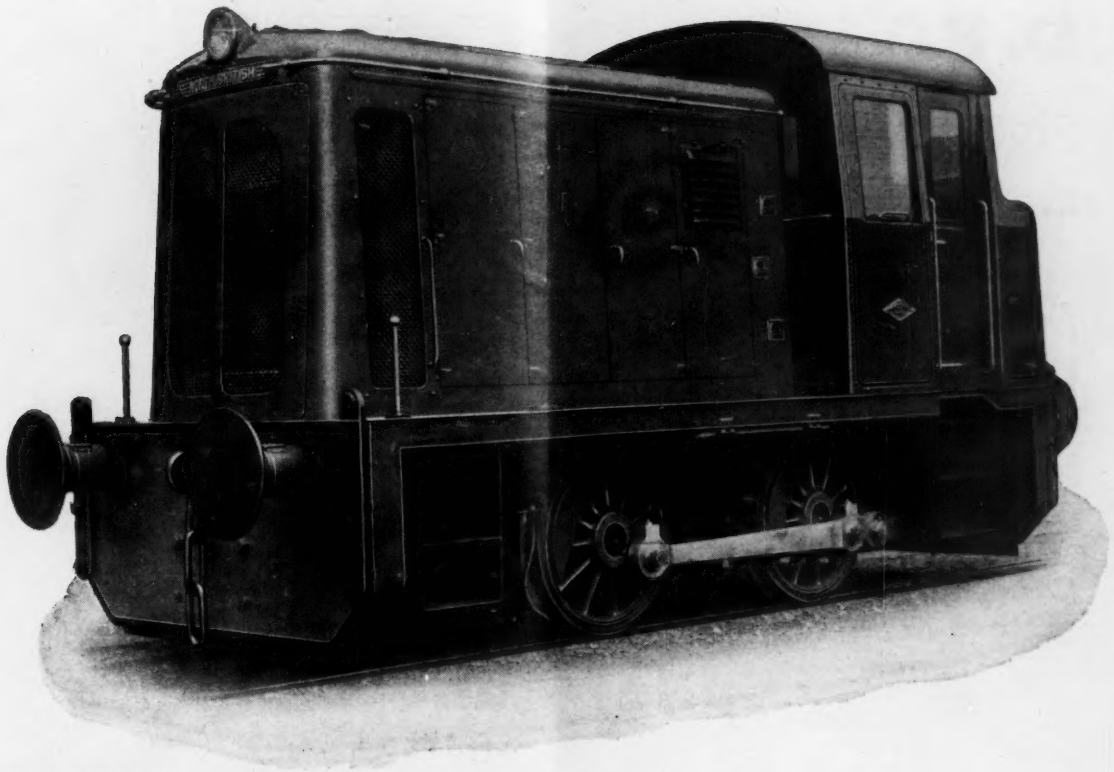

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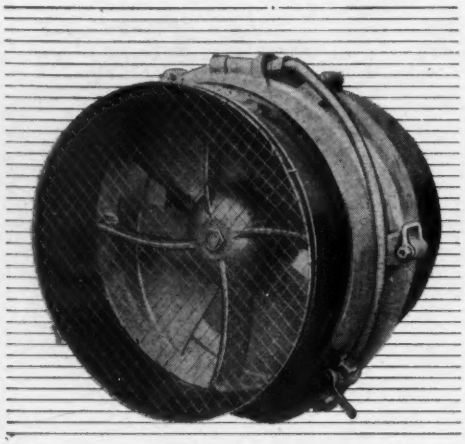

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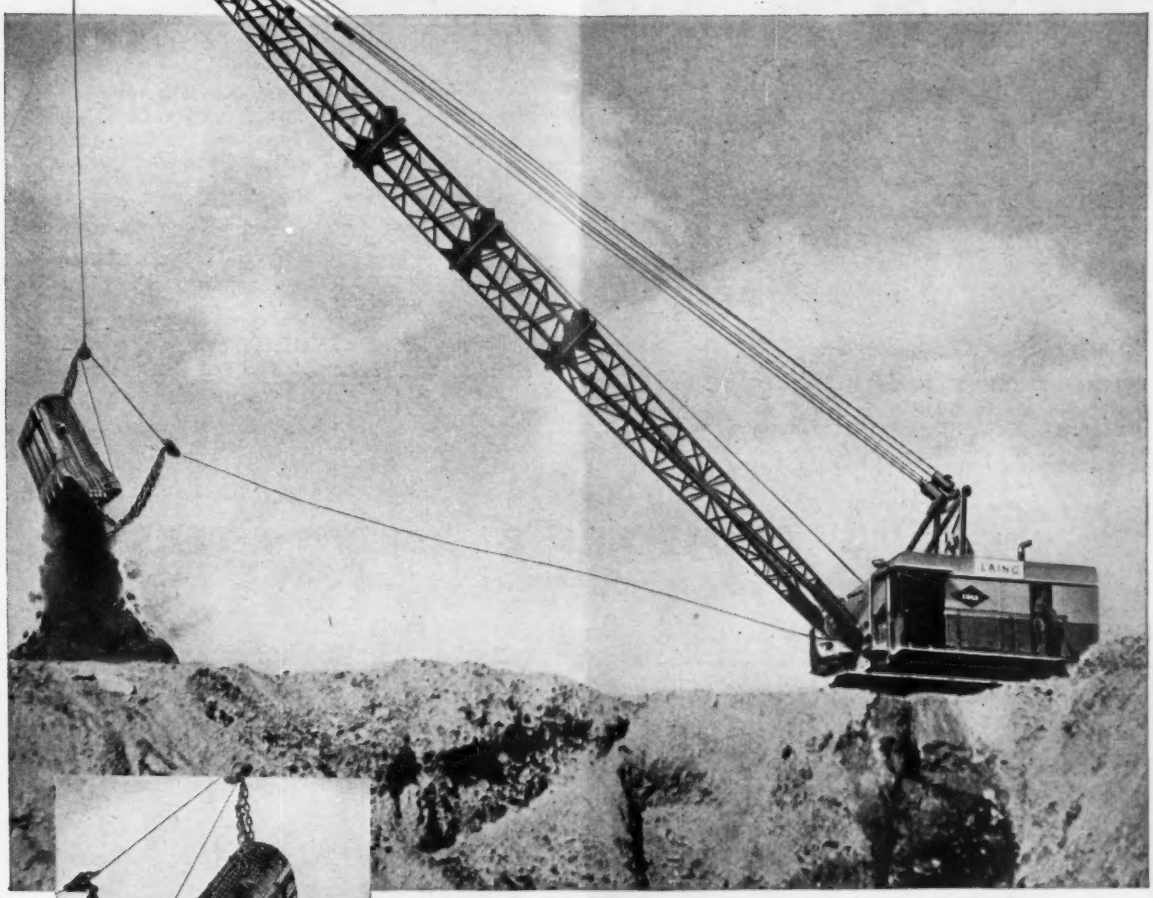

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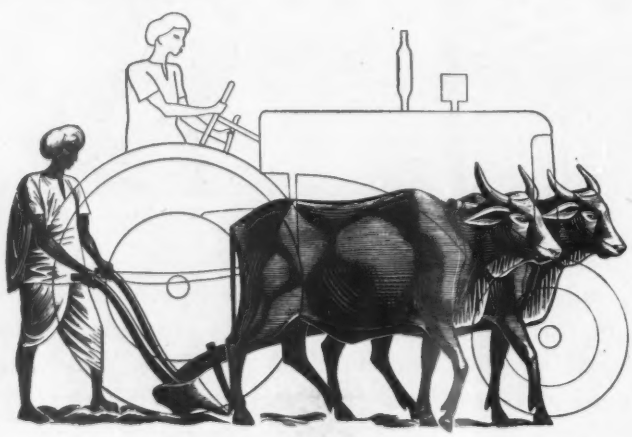

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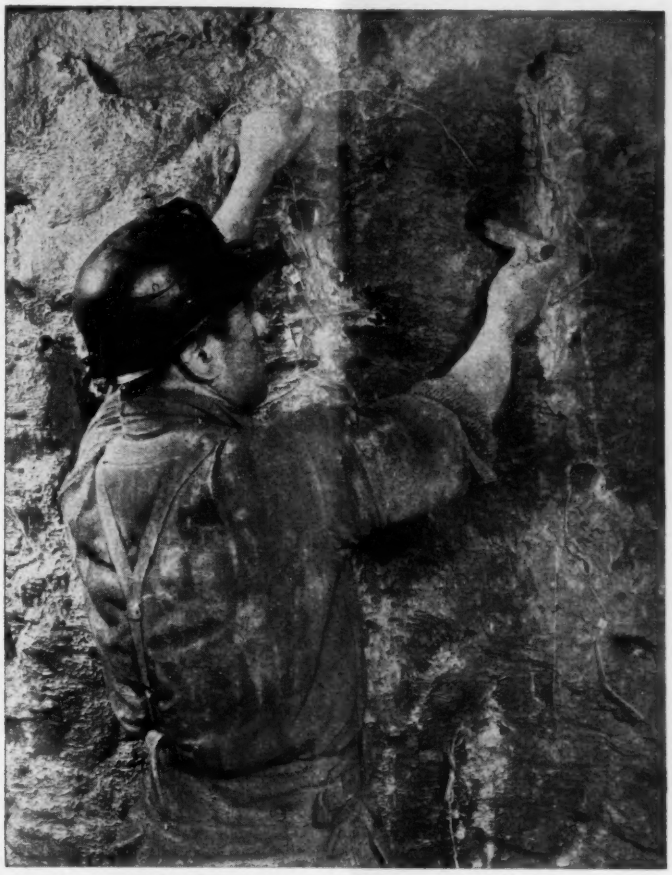

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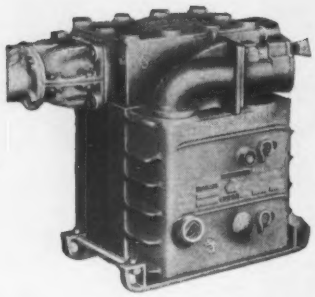
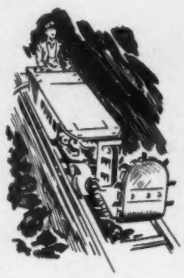
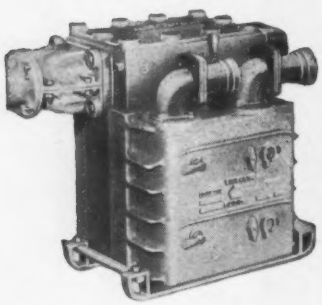


Type BCC.10 Coal Cutter or Conveyor Panel

Generously-rated 3-phase contactor, tested to 600 amps. at 0.4 power factor on 100 operations at three seconds' intervals.
Isolator and contactor mechanically and electrically interlocked.
Pilot circuit to latest intrinsically safe requirements.
Three outlets for interlocking and control circuits plugged in power unit assembly.
Instruments fitted if required.
Earth leakage protection and test circuit.
Pluggable type overload assemblies.

Specification P3/1950

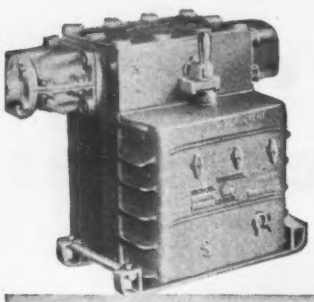




Type BDT.10 Double Unit Drill Panel

Pilot circuit on each of two drill circuits to latest intrinsically safe requirements.
Earth leakage protection independent for each circuit and fitted with indication and test circuits.
Overloads of normal and short circuit capacity fitted as desired by Ministry of Fuel and Power.
Whole control unit pluggable design.

Specification P9/1950



Type BLT.10 Lighting Panel

K.V.A. rating up to 4½ K.V.A. single-phase.
Lining-up features with other makes of N.C.B. Panel.
H.R.C. fuse-switch protection for out-going circuits for normal overload and short circuit conditions.
Three circuit outlets available.

Specification P8/1950

Designed to N.C.B. Specification, these additions to the Siemens-Schuckert range of Flameproof Gate-End Panels incorporate the well-known single lock cover and make use of light alloy casings.

Raising the cover by the single screw bolt automatically disconnects the supply control circuit, already isolated by the generous-sized 3-phase reversing isolator. The plug-in contacts are, therefore, unable to make or break on load current.

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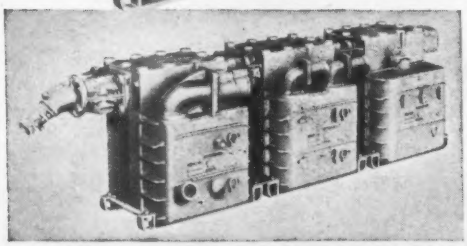

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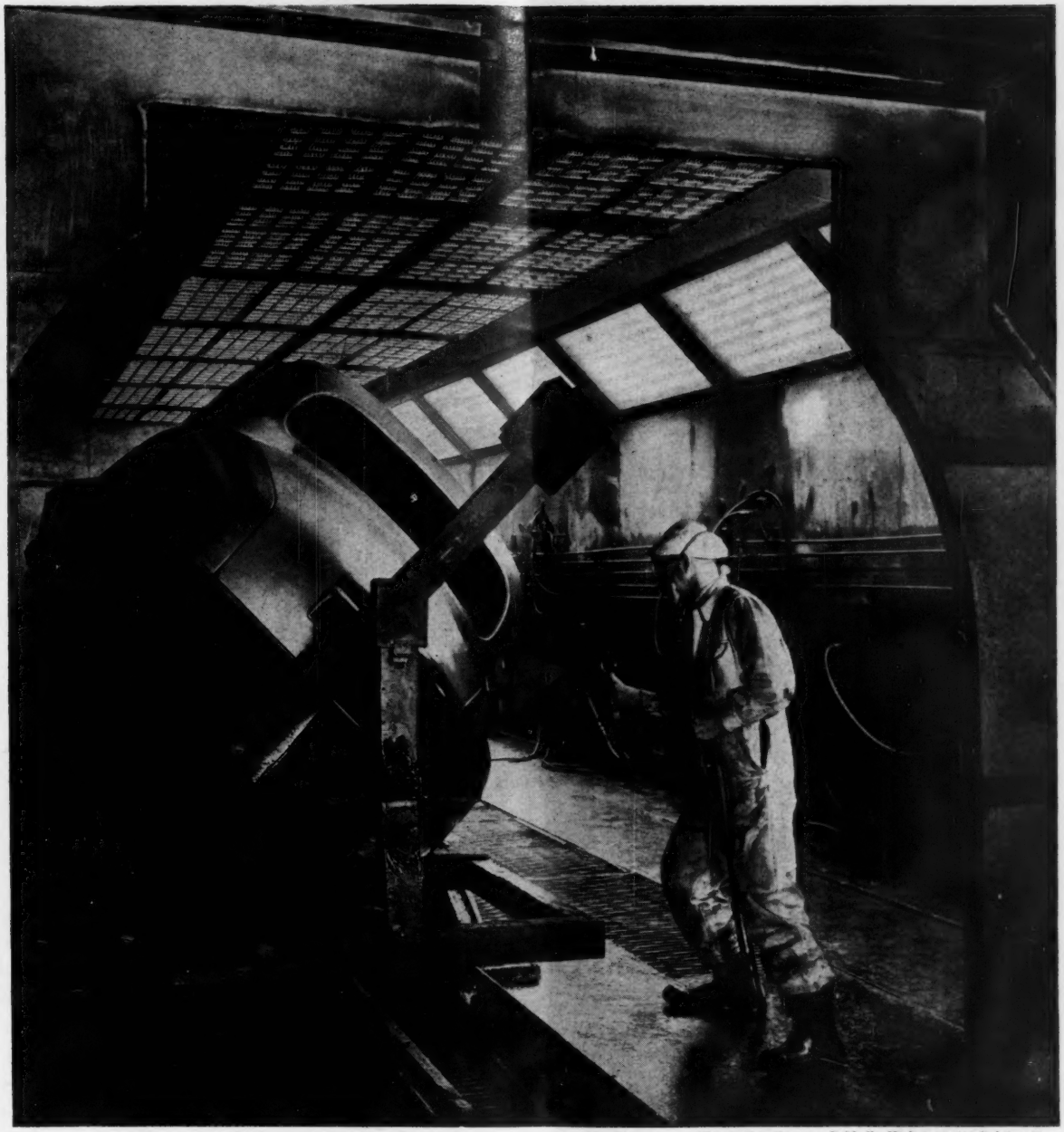

Rover Car Factory, Solihull. High intensity lighting in a body spray tunnel by fluorescent lamps in a glazed enclosure.

Tailored for the job

The lighting of many processes is vital to the smooth and rapid flow of work and to the quality of the finished product. For example, poor lighting could make a spray tunnel into a bottle-neck — each job taking a little too long, a little portion missed, a return to the spray line — and so the whole production line marks time. Whatever form it takes, good lighting not only helps to provide a satisfactory working environment but is an active production tool.

Fluorescent lighting is as good as daylight — only more consistent. It is efficient; it is economical; and it is *flexible*. You can 'tailor' it, easily and exactly, to the special requirements of production at all stages.

HOW TO GET MORE INFORMATION

Your Electricity Board will be glad to advise you on how to use electricity to greater advantage — to save time, money, and materials. The new Electricity and Productivity series of books includes one on lighting — "Lighting in Industry". Copies can be obtained, price 9/- post free, from E.D.A., 2 Savoy Hill, London, W.C.2, or from your Area Electricity Board.

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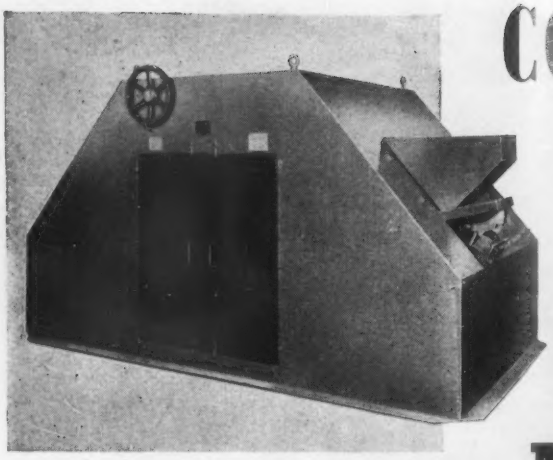

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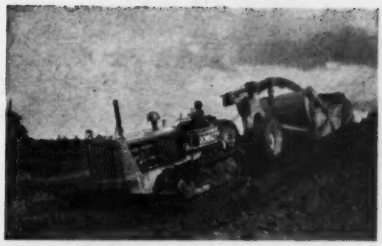
The British 'Challenger' now a world contender

In clay bunkers at Surajpur, India, one man is worth a whole labour battalion when he is at the controls of the powerful Challenger 3. This British Diesel Crawler Tractor is building a great reputation for versatile efficiency right round the world. In countries new to the mechanical age the Challenger's comparative ease of operation and maintenance are proving their worth.



Hauling a 13-yard scraper this Challenger 4 is filling in the worked out Eswood open cast coal site at Essington in Staffordshire.

Five thousand feet up in Southern Rhodesia this Challenger 3 is bulldozing to prepare the ground for a new workshop extension.

Equipped with a 9-yard scraper, this Challenger 3 is moving pure white sand to form a canal near Veta Palama, 300 miles north of Madras.

A Challenger 3 fitted with hydraulically operated Bull-dozer/Angledozer is used by this gasworks in England to stack coal

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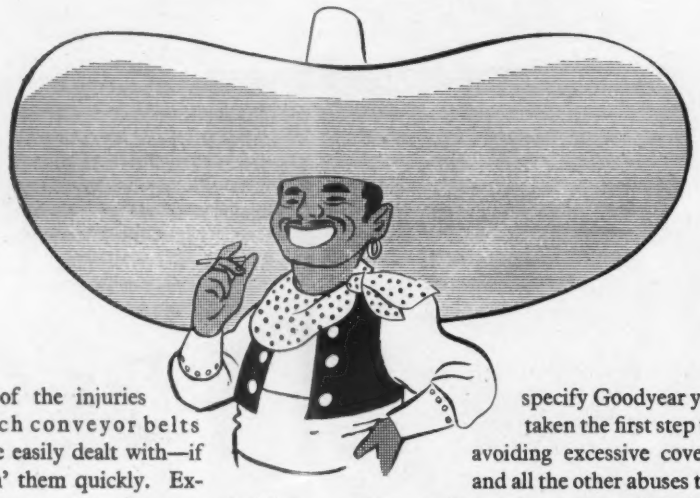
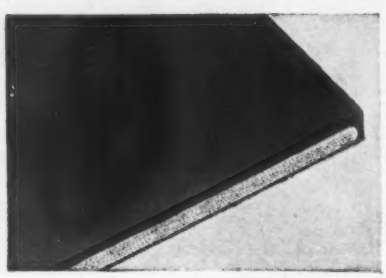


MOST of the injuries which conveyor belts sustain are easily dealt with—if you 'catch' them quickly. Excessive cover wear, for example, has a number of easily remedied causes, but unless prompt action is taken you may shorten the life of a belt considerably. Correct installation and regular maintenance will greatly increase the life of belting—and you'll find out all you want to know about its care in the Goodyear Maintenance Manual. When you specify Goodyear you have taken the first step towards avoiding excessive cover wear, and all the other abuses to which conveyor belts are prone. Whether your problems arise from abrasion, heat, load, lift, speed or troughing, Goodyear can help you!

The Goodyear Maintenance Manual is a very helpful 32-page booklet that is issued free on request. Please write to Dept. D.2, Goodyear Tyre & Rubber Co. (G.B.) Ltd., Wolverhampton, for your copy.



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GOODYEAR

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The Mining Journal

Established 1835

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NOTES AND COMMENTS

Mining in British Guiana Needs a New Deal

Mining has been going on in British Guiana for some 70 years, in the course of which minerals to the value of about £53,000,000—principally gold, diamonds and bauxite—have been won from the interior of the Colony. Aside, however, from the bauxite town of Mackenzie there is little to show in the way of permanent development of the interior and the effectively colonized portion of the territory is still largely limited to a narrow coastal belt with its economy based largely on agriculture.

Despite the importance to Guiana's economy of her mineral wealth, which accounts for one-third of the value of her exports, practically none of the tax revenue accruing to the Government from the mining industry is finding its way back in the form of improved communications or other services which might stimulate further prospecting and investment.

To be blunt, the mining industry has for many years been milked to support a precarious coastal economy. Quite aside from the justice or otherwise of such a situation it is one which cannot be expected to continue indefinitely in the absence of the discovery and development of new deposits, and in the face of the prohibitive transport costs which at present render uneconomic all but the high grade ores.

Those associated with the industry had naturally hoped, not without reason, that the mission sent out to Guiana early last year by the International Bank for Reconstruction and Development might have produced some practical solution to the administrative and financial problems involved in a balanced and planned development of the interior. These hopes have, however, been doomed to disappointment as is made clear in an article by Sir Gordon Lethem on page 294.

Moreover, the Colonial Office shows little sign of developing a viewpoint substantially different from that expressed by the mission. In a statement to the Commons a few weeks ago, Mr. Oliver Lyttelton announced development plans over the next two years calling for the expenditure of some £9,000,000 by the British Government. Yet neither in his statement, nor in the questions which followed, was there any reference to the mining industry nor was there any apparent recognition from either side of the House of the need for, or of the difficulties in the way of, opening up the interior.

As a former Governor of the Colony, Sir Gordon Lethem discusses the mission's report with authority and, it may be added, with a sympathetic understanding of the mining industry's problems. It is painfully clear from his comments that in his view the mission has failed to grasp the special administrative requirements of the interior, and has been content to envisage its development as part of the general economic plan of the Colony. Sir Gordon makes it clear that the energetic development of the interior is unlikely to be achieved except under administrative arrangements whereby responsibility for this work is hived off from the administration of the colonized portion of the territory.

It is not unreasonable to hope that under such conditions systematic surveys both of the mineral and agricultural potential of the various undeveloped areas might result in a combined development plan, justifying expenditure on communications which would not have been practicable in terms of a single mining or agricultural project.

The Gold in Ceylon Controversy

Whether or not gold exists in commercially payable deposits in Ceylon has been the subject of comment in these columns in our issues of February 5 and February 19.

On the one hand, Dr. Kulartnam, Geologist and Mineralogist of the University of Ceylon, said there was gold in the island and supported this statement by referring to assay values yielded from specimens of quartz taken from two districts in Central Ceylon. His assertion together with proposals as to what should be done about forming a gold mining industry in Ceylon, was reported in our issue of February 5. On the other hand, Mr. J. L. D. Fernando, Government Mineralogist, refuted every argument advanced by Dr. Kulartnam and said that the geological evidence available was overwhelmingly against the possibility of there being commercially workable deposits of gold in Ceylon, and his views on this matter were noted in these columns in our issue of February 19.

Our Indian correspondent in his most recent despatch from Colombo, dated March 4, writes that neither Dr. Kulartnam nor Mr. Fernando have been influenced by what the other has said.

In reply to Mr. Fernando's rebuttal of his original assertion, Dr. Kulartnam said that he was still convinced that

there were appreciable deposits of gold in Ceylon. "It is a well established and accepted code among professional geologists and mineralogists," he said, "that the denial of any existence of any mineral in any country should not be made unless and until a thorough and systematic investigation for that mineral had been carried out." Dr. Kulartnam further declared that a geological survey would undoubtedly prove he was right and after pointing out that Mr. Fernando had earlier stated that equipment to carry out assays for gold in the future was already on order he made the point that Mr. Fernando agreed with him on the desirability of pursuing the investigation for gold.

It would appear, from our correspondent's despatch, that there are more adherents to Dr. Kulartnam's view than that of Mr. Fernando. According to a former Government mineralogist, Mr. J. S. Coates, gold was common throughout the island in the form of small grains and scales in river gravels. Mr. Coates' statement was made in 1924 but Dr. Kulartnam supported his point of view with a more recent example when he referred to work carried out by Mr. G. G. Dixon and by Mr. A. K. Coomaraswamy, who both agreed that alluvial gold occurred in small quantities in the central, southern and western portions of the island. Indeed, samples of concentrates sent by Mr. Coomaraswamy to London yielded assay values ranging from 10 dwt. of gold per ton to as much as 215 lb. per ton.

No doubt Mr. Fernando will have something to say about Dr. Kulartnam's most recent statement. But, even if he does not make a further statement for publication, it is unlikely that his department will be unable to dismiss the idea, so that it will not come as a surprise to hear that a geological survey of the island's suspected gold resources has been organized.

Our correspondent has also referred to the progress being made to assess the significance of the reported gold discovery in West Bengal, Bihar, and Orissa States. Mr. K. D. Malaviya, Deputy Minister for Natural Resources of Scientific Research, who made the original announcement which was noted in these columns in our issue of February 5, has now completed an on-the-spot study of the progress made in prospecting operations for gold in the Champua Region of Orissa and of the Dalbhungarh operations of the Bengal-Bihar belt.

The purpose of the present investigations, which are being carried out by the Indian Bureau of Mines, is to find a process suitable for the commercial exploitation of the gold and other metallic and radioactive constituents of the deposits.

In Orissa, the nature of the gold occurrences follows a pattern somewhat similar to that found on the Kolar Gold Fields, but to date neither the extent nor the richness of the deposits over the 43 mile zone has been determined. In Singhbum, Bihar, the Indian Bureau of Mines is conducting drilling operations concurrently with prospecting for uranium. In this connection Mr. Malaviya said that the Atomic Energy Commission had applied for a mining lease to the Bihar Government and that mining operations would commence as soon as the lease was granted for the purpose of extracting uranium. Drilling operations were also being undertaken in other areas for gold, copper and uranium and it is hoped that as a result of the Deputy Minister's visit the development programme would be speeded up and that qualitative and quantitative assessments of the minerals in this area would be completed shortly.

Tax Concessions for Australian Mines

It has been announced in Canberra by Sir Arthur Fadden, Federal Treasurer, that the one-fifth tax exemption on Australian mining profits is to be continued for a further seven years, to June, 1960. The exemption applies to certain specified metals and minerals, and Sir Arthur added that dividends paid by companies wholly and exclusively out of exempt profits earned from the mining of these products would continue to be exempt in shareholders' hands.

Brazil

(From Our Own Correspondent)

Teresopolis, March 5.

The Department of Mineral Production (D.N.P.M.) is compiling a geological map of Brazil and has lately penetrated little known regions of the Amazon watershed. The Araguaia, Tapajos and Xingu Basins are being mapped out by aerial survey and the abundance of rock observed in the two last-named areas is presumed to indicate mineral occurrences of economic value. Samples of the manganese found along the Sucunduri and Curua Rivers are now being examined, while iron and gold are reported to exist along the upper and lower reaches.

Prospecting for coal and oil is being carried out in the Maranham-Piaui region, where Professor Wilhelm Kegel classified coal formations over a large area, and the rare phosphate rocks, known as carbonitites, recently discovered at Jacupiranga, Sao Paulo, are being examined. The calcium phosphate deposits of Fernando Noronha, a convict settlement off the coast of Pernambuco, will be reserved for state exploitation.

In the Sao Joao del Rei zone of Minas Geraes D.N.P.M. is prospecting for uranium, tantalum, tin and lithium and plant is being installed at Nazare to separate and process these minerals. The possibilities of utilizing the semi-oxidized copper ores of the Serval mine, in Rio Grande do Sul, is being explored and refining plant will be installed if experiments prove successful. Finally, the services of Netherlands Government experts have been engaged to examine the prospects for producing nitrogen commercially from Brazilian coal.

THE CARACAS CONFERENCE

Latin American Republics are determined to ventilate the question of raw materials, the basis of their economies, at the Caracas Conference. They complain of persistent attempts to force down the price of minerals, while maintaining that of manufactured products. American buyers are now seeking five to ten year contracts to purchase at present prices, which exporters of copper, lead, tin and zinc consider too low. Brazil will welcome long-term contracts for iron ore and manganese, but will certainly try to obtain more attractive terms than those now offered, although not being in a strong position to insist. The list of 29 strategic minerals which the United States Defense Mobilisation is to accumulate this year includes asbestos, beryllium, mica, aluminium, amosite, refractory chromite, columbite, copper, rough diamonds, chemical manganese, molybdenum, nickel, platinum, selenium and tantalite. As stocks of metallic manganese and zinc are practically complete, none of the materials to be stocked is of vital importance to Latin America, except copper, although several figure in foreign trade returns.

Commencing in 1954, exports of manganese from Minas Geraes are to be reduced annually by 20 per cent, in order to reserve these depleted reserves for local consumption. The output of the Amapa and Urucum mines should suffice to meet foreign market demands within five years. Contracts to exploit the Urucum deposits during fifty years were

signed in December between the Mato Grosso government and Sociedade Brasileira de Mineraçao (*The Mining Journal*, November 14, 1952).

Comparing January-October of 1952 with the comparable period of 1953, Brazil's exports of iron ore decreased last year by 62,070 tons, to 1,211,063, while prices dropped from U.S.$18.50 per ton at the end of 1952 to an average of U.S.$16.44 during 1953. The price dispute early last year led to the curtailment of United States purchases, but sales to Europe increased. Imports by Great Britain had reached 253,175 tons, valued at £2,346,725, by October 31 and contracts have been signed to deliver 1,000,000 tons to Europe during 1954. Sales to Germany are expected to fall off owing to decreased steel production. Brazilian shipments of quartz to October 31 totalled 751 tons, a drop of 6 tons, while exports of manganese increased 23,842 tons, to 153,250, and wolfram by 165 tons, to 7,511.

South Africa

(From Our South African Correspondent)

Johannesburg, March 3.

The main talking point in the field of gold mining activity in the Union is whether the March quarterly progress reports from the Free State are going to surpass those for the previous three months and set the sharemarkets off on a further upward surge. So far, there has been a sharp revival of investment in gold mining shares. Should this spread, it presents the possibility that capital will become available for expanding existing undertakings and opening new enterprises.

ALTERED LOAN BASIS

The shortage of capital funds over the past year or so has not only forced the financing of mining activity more and more on to a loan basis, an expensive device, but has also necessitated the virtual clamping down on the opening up of any new major properties. In the Free State alone, there are two areas which have been shown to be payable to the extent to which shaft-sinking can be started, namely the Van den Heevers Rust area, lying to the west of Freddies North, and the Saaiplaas area to the north of Harmony.

In addition, as has been mentioned previously (see *The Mining Journal*, January 22, 1954), re-drilling of the Erfdeel-Dankbaarheid area is to be undertaken. The possibility of this district becoming a major producer cannot be ruled out. Apart from likely big properties, there are a number of areas which could well be developed on the basis of relatively low capacities but with prospects of reasonable profits. Ellaton G.M. in the Klerksdorp district has been opened on this basis, and according to drilling results there seems to be no reason why this pattern should not be developed elsewhere.

It is this question of the building up of adequate supplies of risk capital which may well determine the rate at which the Bethal area can be opened, provided, of course, that drilling results warrant this activity. According to the scant information available, the outlook seems fairly promising, but, no matter how good the area may prove to be, the absence of risk capital could hold up its exploitation for many years.

There can be little doubt that the volume of savings in South Africa has been building up at a most satisfactory rate in recent years. Money invested in building societies has risen sharply, and towards the end of January a share offer in a South African bank was 90 per cent oversubscribed and a local £5,000,000 municipal loan was oversubscribed in a matter of minutes.

The problem is to win back the confidence of the public in gold shares, which has been sadly undermined over the previous six years. The last batch of quarterly reports have gone a good way to doing this, and the feeling is that if the new mines confirm their earlier promise over the rest of this year, the problem of financing new undertakings through the issue of ordinary shares will be largely solved.

INCREASED LABOUR FORCE

One of the more interesting developments of the past month—outside of the Free State fireworks—has been the quite appreciable increase in the native labour force. The figure for January was nearly 314,000, compared with 300,000 in December and 301,000 for January, 1953. This total is still far below requirements, but it may mean that the supply curve is on its way up again.

The main burden of the shortage falls upon the shoulders of the older "straight" gold producers which have to take a back seat to the new mines and the uranium properties. They have been suffering for some time past from both power and labour shortages, a factor which has resulted in reductions in tonnages milled. These have added to working costs in addition to the inflationary influences affecting the industry as a whole.

Any improvement in the labour or power situations, either individually or together, can prove to be of major importance to this section of the gold mining industry, where so many mines are in such a position that any reduction in working costs per ton would be sharply reflected in working profits and consequent dividend payments.

This position is clearly illustrated in the December mining returns where working profits per ton were as follows for typical mines in this group: Cons. Main Reef, 2s. 5d.; City Deep, 2s. 3d.; Simmer and Jack, 1s. 10d.; Rand Leases, 1s. 8d.; and Springs, 1s. 4d. The matter of a drop in working costs of a few pence per ton would make an appreciable difference to these properties.

The power position is gradually improving, as more Escom plants are being brought into commission, and the end of the year should see considerable relief in the situation.

A FURTHER URANIUM INVESTIGATION

Apart from the news that the big uranium plant at Randfontein is now turning over, an interesting development in this particular field is that three companies of the Northern African Mining group which controls New Kleinfontein, Afrikander Lease, C.S.A. Lands and Tanganyika Central, have been granted permission to investigate the occurrence of uranium over some 12,000 acres to the west of Klerksdorp. This ground is bounded on the east side by the Afrikander Mine and Babrosco which together with New Klerksdorp and Ellaton are scheduled to pump uranium-bearing slimes to the expanded Stilfontein plant, and on the south by Dominion Reefs which has obtained a loan of £2,000,000 for its own extraction plant.

The gold contents of the reef formations in this area are extremely low, but it would seem that the uranium values run at a high level on the mines already included in the scheme. Uranium values, like those of gold, vary not only from mine to mine but from point to point within a property. Nevertheless, the possibility does exist that uranium occurs in economic quantities in this particular area. If this be the case, the importance of Klerksdorp as a new major mining area will grow, as six major gold producers are either in operation or are on the way to production in the district, together with a number of uranium properties.

The Development of British Guiana

A Review by SIR GORDON LETHEM, K.C.M.G.

Early last year a mission organized by the International Bank for Reconstruction and Development spent six weeks surveying the economy of British Guiana at the invitation of the Government of that Colony. The composition of the mission, which was essentially technical in character, was notable for the omission of any recognized authority on mining—a fact which possibly accounts for the singular lack of emphasis given to this vital industry by the mission in its report. Be that as it may the report is unlikely to get a very sympathetic reception from those acquainted with the Colony's mining industry. On receiving a copy of the report *The Mining Journal* invited Sir Gordon Lethem, Governor of the Colony from 1941 to 1946, to discuss its recommendations. He has done so in the article which follows.

The report of the International Bank Mission on "The Economic Development of British Guiana" will be read with keen appreciation by everyone interested in the future of that most challenging country. It gives a balanced and just appraisal not only of present conditions but also of the development planning and achievement of the colonial administration, which receives no little judicious praise. And while the difficulties are not minimized the assuring and confident assertion is made that "the mission believes that, with energy and goodwill, the problems of the colony can be solved and its continued progress assured."

To many, however, there will be one considerable disappointment, to wit, that the problem of the development of the interior of the country is left in the air, with nothing new said. The mission very rightly insists that the urgency of immediate development requires that "at least in the short run . . . development must take place primarily in the coastal area." That is of course where the great mass of the population, whose problems are acute, lies. The "obvious challenge" of the interior is admitted but recommendations for action now are confined to investigational surveys and limited advances intended to promote further development in later years. This is described by the mission as "a fairly substantial share of the proposed development programme" (i.e., for the whole country) "on the basis of population," almost as if the question of the interior were being considered for the first time.

But, in fact, it is more than a hundred years since the British administration began to define and safeguard its landward frontiers vis-à-vis the South American republics. It is over seventy years since the gold and diamond deposits began to be exploited and forty years since the now so important bauxite exploitation was first foreshadowed. In short, those with some perspective of Guiana history will feel that the time has more than come to give forcible expression to two major criticisms.

TWO MAJOR CRITICISMS

The first is that the failure in the past, particularly in the first decades of the century, to establish some reasonable framework of administration up to the frontier, with some communications and principal services, is nothing short of a crying disgrace to British colonial rule. Had British Guiana been in Africa some such framework would have been created at Imperial expense in the years before World War I. Actually, it was left to a coast colonial government possessing neither the means nor the men; and inevitably nothing effective was done.

The second is that for three generations there has been accruing to the colonial government and to the coast colony, directly and indirectly, a revenue from mining exploitation which must over the years have been very considerable. Of this, practically nothing has been "ploughed back."

The lesson is surely clear. A separate organization is required, with the specific task of interior development, similar to those developed for African protectorates and hinterland regions. Interior development cannot be deferred, decade after decade, to the exigencies of the coastal region.

We have not only the British and French examples in Africa, we have the immediate example of Brazil. A number of years ago the upper Amazon region of Acre was made a "territorio federal" and so a responsibility of the central government and not of a state or provincial government. The experiment was so successful that it was followed on a wider scale in the 1940s. Thus the Rio Branco area adjoining Guiana to the south-west was detached from the province of Amazonas and given its own administrator and staff and substantial development expenditure from central sources. In British Guiana a start with a forward-looking plan with objectives of this character had already been made, but it has not been pursued to a logical conclusion. The suggestion of a "British Guiana Development Corporation" to be "concerned mainly with the promotion of development in the interior" was made in 1948 by the Settlement Commission, but has been allowed to drop into oblivion. (Incidentally it may be remarked that the careful and detailed studies of this Commission receive apparently no mention whatever by the International Bank Mission.) It may be added for completeness of the record that the West India Royal Commission of 1939—viewing the West Indian scene on an all-Caribbean scale and concerned with the question of poverty and unrest—apparently contented itself with a single and contemptuous reference to "the problematic wealth of the interior."

Yet thirty-two years ago the present Lords Halifax and Harlech, then Major Wood and Mr. Ormsby-Gore, had given wise advice—suggesting that there were two possible alternatives: "(a) a policy of attracting private capital by means of large land grants or other concessions; (b) a policy of dividing the Colony into two, leaving one portion under the existing Government and organizing the remainder under a separate administration." The view was expressed that "these two alternatives should be energetically explored by the Colonial Office and by the Colonial Government. It is a big task that should be handled on broad and generous lines." That vision was allowed to fade away, though as already noted an attempt was made to revive it in the Colony in the 1940s.

Had this advice been followed, it would at least have meant that an imperial responsibility had been faced and a purposeful policy developed. It might have meant that wealth won in the interior would have been used where it had been won, and that there might, for example, have been some effective attempt at establishing communications on a bigger scale than the single effort of the Potaro Road.

TRANSPORT COSTS ARE CRUCIAL

Unless such things are done the prospect of ever achieving any effective opening up of the interior is poor. In the case of mining development the costs of transport are at present so prohibitive as to render uneconomic all but the higher grade deposits. Unless facilities are improved and costs reduced, mining on any substantial scale seems destined to end in Guiana in the foreseeable future. It is even now true to say that the interior is being plundered in the interest of the coastal region. However, nothing of these facts is indicated in the report of the International Bank Mission, the

membership of which, incidentally, contains no mining expert, although agriculture and forestry are well represented.

It is usual to say that we know too little about the interior. That is true of course of its 75,000 square miles. But enough is known by the many competent people who have lived and worked in it to permit a decision for a beginning at some known point of entry for the line of advance.

The colonial government has apparently proposed a "special commission to promote the development of the interior," which would no doubt not only supplement the very good if limited steps forward taken in recent years, but also accelerate and expand advance beyond the merely investigational stage. This the mission does not favour but proposes that all that is necessary can be carried out by the existing government departments and private persons as "an integral part of the overall programme," i.e., of the colony as a whole, and considers that special machinery will "emphasize the conflicting rather than the common interests." That sounds well-said and wise, but the conflict is there all the same, as in all colonial territories of this type even with less fundamental contrasts than in Guiana. The writer, and, he feels sure, those who know the interior and its history, would prefer the government point of view and would entirely disagree with that put forward by the mission. To follow that would only result in indecisive and interrupted trifling with the task.

What is required is a single-minded determination to face up to a responsibility. Pilot schemes, soil research, investigational surveys of all kinds are, of course, important. But a directing, co-ordinating command is required, with concentration on one or other of the gateways into the interior and with action on the spot and not from an office in Georgetown.

Let the approach be either the Bartica-Potaro-Konawaruk line, or probably better Atkinson, McKenzie, Wismar, Potaro river, Tumatumari, Konawaruk, and then the 100 miles over country that has a potential, to the savannahs. Let there be a concentration of effort on the line, whether of agricultural or geological surveys, public works or general services. Let the job be put in the hands, not of a commission making reports, but of a few people with a passion for getting practical works carried through. Put in an engineer of quality at their head — the choice of an R.E. has good precedent in Africa. Give funds and authority and a fair share of the revenue from, at the least, mining. We would see real results in five years.

We may be told that such a plan is not now politically possible. It is very true that it would have been infinitely easier in the 1920s or at any time before World War II. In still earlier times the solution of private enterprise with important concessions, as put forward in 1908, or even the chartered company on the 19th century model, might have been possible. To-day the willing consent of the whole community of the Guianese must be secured, and the co-operation of the new form of government of the colony.

Whether the wisdom of embarking on such a plan as now proposed to secure tangible results would appeal to the new order, the writer cannot say. But he is very sure that without bold and radical husbandry the estate will further run to seed. Even advances made in recent years may not escape the retrocession which has overwhelmed the forward movements of the past and is evident in the Guiana "bush" to all who care to look.

In the tempo of to-day the claim of Britain to retain the title to this land might very properly be called in question. Lord Halifax has been quoted as to the "big task that should be handled on broad and generous lines." This was said thirty-two years ago. Has the task been so handled in these thirty-two years? Is it going to be now?

EUROPEAN MINING—I

Mining Progress in Southern Europe

The progress and prospects of mining in Southern Europe are reviewed in a report entitled *Economic Survey of Europe in 1953*, which has been prepared by the Research and Planning Division of the Economic Commission for Europe. This study was made in response to a resolution inviting the Executive Secretary to prepare a study of the present possibilities of expanding and accelerating the economic development of the less-developed countries in Southern Europe. The following article traces the pattern of development outlined in this survey, while a subsequent instalment will consider the problems of promoting more effective mineral exploitation.

In countries where economic life is generally stagnant, the lack of internal markets, transport and power, together with scarcity of capital, tend to restrict the opportunities for mining enterprise to easily accessible resources which promise relatively quick profits. This kind of mining development, which, broadly, was characteristic of Southern Europe up to the first World War, was largely based on foreign capital. The results of this period of mining exploitation on the various Southern European countries are briefly reviewed.

Towards the end of the nineteenth century Turkey had a near monopoly in chrome, and production for export was rapidly developed by foreign capital. But the market situation was subsequently influenced by discoveries elsewhere and a decline set in after 1901. In copper, lead and manganese an early start was made by foreign investors, but in each case the peak was reached between 1900 and 1905.

In Greece, iron ore was extracted at an annual rate of about half a million tons in the decade preceding the first World War, but since then production has been much lower. Mining of manganese ore, zinc and lead was important, but in all these cases the peak was passed before 1914. Two rare products found in Greece are emery (in the Isle of Naxos, under communal ownership) and magnesite (under British control). In both cases the level of output has been fairly well maintained. In the inter-war period, export demand led to the exploitation of several other mineral deposits, including chrome, nickel, bauxite and iron pyrites.

Although the substrata of Yugoslavia are unusually rich in minerals, a modern mining industry had scarcely started in this country before the first World War. Between the wars rapid development took place, foreign capital concentrating on the more profitable export sectors, while coal and iron were developed largely under State ownership. Before the second World War, the share of foreign capital in metal-ore mining (measured by the value of output) was as much as nine-tenths. In general, Yugoslavia exported ores and had to import metals for her own requirements. In the 'thirties, some measures were taken to change this situation; for example, by compelling French and British interests, exploiting respectively copper and lead, to build up smelting capacity within the country.

The history of Sicilian sulphur has been influenced to an exceptional degree by the vicissitudes of foreign demand and technological change. At the beginning of the nineteenth century, when world demand for sulphuric acid became important, Sicily was practically the only known source of the raw material. The high price resulting from this monopoly led to the development of sulphuric acid production from pyrites. In the second half of the century, Sicilian sulphur production recovered from this first crisis under the impact of a new demand for sulphur for vines. The price policy of the Anglo-Sicilian sulphur cartel then led to the development of the competing Frash method of sulphur extraction. When U.S. production started on a large scale in the early twentieth century, Sicilian sulphur mining started to decline.

Extraction of metal ores in Sardinia remained insignificant until the middle of the nineteenth century, when, partly because of the exhaustion of Central European mines, foreign demand for Italian lead became important. At this stage a considerable portion of Sardinian mining was in the hands of foreign companies and all the output was exported as crude ore. Not till the 'thirties was sufficient smelting capacity for lead built in Sardinia, and zinc has still to be sent to the Italian mainland as crude ore.

Spanish iron ore, of excellent grade and situated very favourably on the Biscayan coast, was early exploited with the participation of British capital. Production rose to a peak of 9,000,000 tons in 1910-1914, but subsequently declined steeply mainly through exhaustion of the more easily exploitable deposits. Similarly, the easiest and richest deposits of copper, lead, zinc and tin were exploited at an early stage, for the most part with foreign capital, and in each case the peak output was reached before the first World War.

Portugal, like Yugoslavia, had no important mining activity before the first World War. In the inter-war period British capital developed the mining of wolfram, tin and copper. Pyrites was extracted by British and Belgian firms which also built capacity for processing a part of the product within the country. On the other hand, mining of Portugal's rich iron-ore reserves has not yet begun.

MINING PRODUCTION IN SOUTHERN EUROPEAN COUNTRIES

Index numbers - 1928-34=100

Period	*Turkey*	*Greece*	*Yugo-slavia*	*Sthn. Italy*	*Spain*	*Portugal*
1901-06	145	78*a*	..	..	151	..
1907-13	113	251*b*	..	119*c*	164	..
1914-20	26	110	9*d*	79	108	..
1921-27	58	109	32	86	105	82*e*
1928-34	100	100	100	100	100	100
1935-39	308	156*f*	188*b*	114	64	194
1940-45	230	..	..	77	47	205
1946	216	20	159	48	54	96
1947	276	27	207	76	49	192
1948	423	24	246	91	57	234
1949	564	27	277	97	62	254
1950	560	50	300	117	72	245
1951	751	104	301	135	83	349
1952	..	..	324	146	..	368

a 1900-09. *b* 1910-13. *c* 1911-13. *d* 1919-20. *e* 1922-27. *f* 1935-38. The horizontal lines indicate a break in the series.

FOREIGN CAPITAL STIMULATED MINING

In all six countries the trend of mining development up to the first World War, and in some respects during the inter-war period, has been very similar. The initiative for mining activity usually came from foreign capital and the tendency was to exploit the most immediately profitable opportunities. Production was generally started to meet an acute foreign demand, and as production facilities were developed elsewhere, the particularly favourable prices at first enjoyed proved to be only temporary. Finally, the ore was almost invariably exported in its crude form or as metal. This picture of a more or less rapid increase followed by decline is also found elsewhere. What seems to be peculiar to Europe, and to other countries producing mainly for export, is the shortness of the cycle of growth and decay.

In more recent years all Southern European countries have taken steps to promote the general development of their economies. In these circumstances, mining has been regarded not as an easy venture for quick returns but as an integral part of an economic structure to be purposively built up.

EXTENT OF GOVERNMENT PARTICIPATION

While Government intervention was not wholly absent in any of the countries, by far the most comprehensive measures were taken in Turkey and Yugoslavia. In 1937, the Turkish Government greatly increased State participation in mining. Very large investments were made, especially in coal and iron ore mining, as well as copper and chrome, and spectacular increases in production resulted. Latterly government investment in mining has been more limited and in the next few years it is expected to decline.

In Yugoslavia those fields of mining (coal, iron ore and oil) which were needed as a basis for national industry and did not attract foreign capital, were in the inter-war period developed under *régie fiscale*. Since the war practically all mining has been socialized, and there has been heavy investment, especially in coal and lignite, petroleum and gas, bauxite, iron ore, chrome and some other non-ferrous metals, and in several cases production is already much greater than before the war.

In Greece, an active mining policy has only very recently been adopted. The Government envisages an increase in mining production — in particular, of lignite and iron ore —of 180 per cent during the period from 1951 to 1954/55. This is to be secured through public credit facilities—and possibly fiscal incentives—to private undertakings. The plans also include the building up by the State or with State aid of industries using Greek minerals.

In Spain, Government intervention is mainly concentrated on expansion of lignite production by the provision of finance through the State holding company, I.N.I.

In Portugal, as in Greece, State intervention has been limited. So far, it has not gone beyond mining research, which has resulted in the discovery of rich iron-ore deposits. A recent six-year plan envisages the building up of a steel industry, drawing its supplies from these deposits.

In Southern Italy, the mining of strategic metals and of Sardinian coal was developed and carried out at the time of the inter-war "autarchy drive," and some State enterprises were organized which still exist.

These examples indicate the extent and the forms of the new wave of mining activity in Southern Europe in the last quarter-century. In some cases, new enterprises arose spontaneously as a result of new demand from local industries, but far more frequent and important are the cases where Governments have undertaken — though by widely differing methods—to develop mining. In this process, the stress has almost invariably been placed on mining to supply home industry and particular efforts have been made to improve the home supply of fuel and iron ore.

The table shows the mineral outputs of six countries reviewed from 1901 to 1952. The series of elementary index numbers have been calculated with the yearly average 1928-34 as a base. The figures given do not represent precise measures of the levels of mining production, but serve simply to illustrate the trend. Coal is not included.

Fluorescence for the Examination of Minerals

By A. W. WILLIAMS, Ph.D., F.C.S.

The mechanism of the fluoresence process is not fully understood, but it appears that certain atoms will absorb ultra-violet light and undergo internal disturbances, which are not stable but which tend to readjust themselves, and in so doing release energy as fluorescence. Physical variations, for example, particle size, or chemical differences too minute for easy detection by other means, determine the different fluorescent colours, which form a good guide as to the purity of the materials.

Since in numerous instances the re-emission of absorbed high-energy ultra-violet rays as visible light is specific and characteristic for the substance irradiated, fluorescence analysis has become one of the simplest, speediest, and most reliable means of examining unknown substances, and of verifying the presence in known substances of suspected constituents. Imitations, or substitutes, irrespective of their detectability by the naked eye, seldom fluoresce in the same colour as the natural product. For example, prepared chalk glows flesh or peach coloured, while precipitated chalk of pharmacopoeia quality exhibits a grey-violet fluorescence.

The action of ultra-violet rays on 13,000 varieties of minerals has been investigated and it has been found in many instances that the reaction of specimens to the rays is so characteristic that it serves both to identify the mineral and even to determine its origin. Specimens of different origin show characteristic differences in fluorescence. Fluorescent effects are particularly brilliant in the willemite group. Probably due to traces of organic matter, many fossils exhibit fluorescence when exposed to ultra-violet rays, and in some cases the anatomy of the specimen and its extensions such as tentacles, otherwise indistinct, stand out clearly under the dark rays. The Mineral Gallery at the British Museum (Natural History) contains an interesting fluorescence exhibit, and many other museums have since installed fluorescence cabinets.

Coal of different origin shows variations of fluorescence according to type and age, and the method is also valuable for the chromatographic analysis of constituents of coal tar. Constituents in ultra-violet rays produce colour variations in the samples. Bitumens for road-making can be identified, and coal tar pitch is detectable in asphalt (petroleum pitch) even down to one part in 50,000. This method has been used for estimating the components of these mixtures with an accuracy to within a few per cent. Blended oils, and oils in oil/water emulsions have been similarly estimated. There are marked differences under the ultra-violet lamp between oils produced from paraffinic and from naphthenic bases, a feature valuable in sorting oil mixtures.

FLUORESCENT EXAMINATION

Fluorescent examination gives useful indications regarding the origin and processing of shale oil, and with practice it becomes possible to grade fractions by their fluorescence. Most petroleums show bluish reactions, but the shade of colour and intensity vary over a wide range for different samples. The presence of oil, where unwanted, is readily detected by this means. As an instance of many found in industry, the Lockheed fluid used in hydraulic braking systems has two characteristic fluorescences of its own: first, when fresh, and second, after a period of use in contact with the rubber in the mechanism. If the fluid becomes contaminated with mineral oil, however, it acquires a bright fluorescent glow.

The presence of only 1 per cent of mineral wax in beeswax is plainly discernible; the degree of fluorescence increases progressively with the amount of added mineral wax. As little as 0.1 per cent of carnauba wax can be detected in admixture with the majority of the waxes, all of which have typical fluorescences in the solid state when examined in chloroform solutions.

SHORT-WAVE IRRADIATION

The portable short-wave lamp is being extensively employed in field work for identifying petroleums in sands, shales, drilling cores, and even in soil samples. The presence of petroleum or bitumen in sand or powdered ore can be detected down to 0.1 per cent by sprinkling it on the surface of chloroform, and noting under the lamp whether fluorescent streamers are formed. The portable short-wave lamp differs in many ways from the usual ultra-violet lamp used in laboratories, etc., and it is a more recent addition to the equipment used in this field. Hitherto, the usual practice has been to use high-pressure mercury arcs as sources, combined with Wood's filters of nickel oxide glass which transmits rays around 3,660 Angstrom Units in length. The high-pressure arc can, however, only be operated from electrical mains, owing to its operating characteristics.

Recently, fluorescent filters have been developed which transmit much shorter wavelengths. These make it possible to use low-pressure mercury discharge tubes as sources for the exciting rays. Such low-pressure tubes emit practically all their radiation as the "resonance" line of 2,537 Angstrom Units, and although high voltage is needed to operate the discharge, the current load is so small that portable dry batteries can be used; hence the whole outfit can be made portable and may be used for exploration work.

The portable equipment enables a geologist, prospector or mining engineer to apply the fluorescence test in any circumstances. Mineral faces can be inspected in a mine; drilling cores examined on the spot. Examination has, of course, to be made in darkness, and while in a mine this presents no difficulty, in other places a black cloth is used to surround the equipment and specimen. Thus the portable equipment extends greatly the scope for ultra-violet technique. In addition, the use of the shorter wavelength widens the scope of the fluorescence test, since certain substances which are inert to longer radiations exhibit brilliant fluorescence under the new lamp.

Two outstanding instances are the tungsten minerals, scheelite, powellite, and cupro-scheelite; the other group being the mercury minerals. The tungsten minerals and salts fluoresce, in various characteristic colours, only in the short wavelength rays; while the mercury ores when heated give off mercury vapour, the presence of which is readily detected by the shadow it casts on a fluorescent screen in the rays of the lamp. Some of the lesser mercury minerals also give direct fluorescence, but the colours are not specific. Practically all the uranium minerals are fluorescent and respond either to the long or the short rays; this is true also of calcite and the familiar range of fluorescent minerals.

Portable fluorescent lamps are employed for the assay of rocks for uranium, and quantities as low as 1×10^{-6} can be detected by a bead test with borax or sodium fluoride. The lamps are also used in prospecting for scheelite, which when pure gives a strong blue reaction to filtered 2,537 A.U. radiation; whereas molybdenum alters this colour through white to yellow as its amount increases.

Experiments and Developments in Coal Mining

In a paper to the Midlands Branch of the National Association of Colliery Managers last month Mr. E. F. Brown, the Director General of Production of the National Coal Board, gave an outline of recent and current developments in the coalfields. Some of the methods and machines mentioned in the paper have been described previously in *The Mining Journal* and the following summary is therefore confined to some of the current matters only, with additional notes on winding and haulage.

A great deal of exploration by boring is going on in the coalfields and the National Coal Board have decided to extend this work beyond dry land off the North-East Coast, where much of the remaining reserves of coal lie under the sea. Boring is to be carried out from a floating platform about 3½ miles off shore with a rig similar to that used for oil drilling in deep waters. If these initial trials are successful, similar tests will be conducted off the Cumberland coast, in the Dee Estuary and in the Firth of Forth. Every scientific aid is being sought to get the maximum amount of information from these tests to keep down the expenditure on core drilling. It has been found that the geothermic gradient often changes abruptly in the neighbourhood of a coal seam and useful deductions can be drawn from temperature measurements provided they are taken without delay after drilling.

MECHANICAL LOADING IN SHAFT SINKING

Experiments which have so far been carried out with mechanical methods of loading in shaft sinking have not been very successful but further trials are to be made with rigs similar to those used recently in South Africa. Concrete is to be used in frozen strata for the first time in Great Britain to line some of the shafts which are now being sunk in the Midlands. The buntons in these shafts are to be supported on brackets bolted to the lining instead of having their ends embedded in the concrete. This will reduce the cost and strengthen the walls by leaving them intact.

Consideration is being given to the possibility of using the multi-rope system in conjunction with the Koepe winders which are to be installed at some of the new collieries. This system, which consists of two or more ropes in parallel, provides a better grip on the driving pulley and a higher factor of safety than a single rope. The first installation of this kind was designed in Germany to hoist a net load of 27,000 lb. from an ultimate depth of 4,590 ft. at a maximum speed of 3,540 ft. per min. Four ropes each 1.75 in. in diameter were specified for this duty whereas a single rope would have to be 3.5 in. in diameter. It was this consideration which led to the decision to use the multi-rope system but lately this system has become popular in Germany and Sweden on its general merits.

Since an A.C. winder is considerably cheaper than a Ward-Leonard D.C. winder, many efforts have been made to overcome some of the inherent disadvantages of the induction motor for winding. It has already been greatly improved by the use of direct current for dynamic braking and new electrical devices are now being developed to give it more suitable characteristics for automatic control. Some A.C. winders are already arranged for push-button operation when required but they do not work well under these conditions on variable loads and for this reason they have been more successful with skips than with cages.

A new method of preventing dust from entering the downcast shaft is to be introduced shortly on a skip winding installation. It is based on the use of a funnel in the chute to direct the air which is displaced by the falling coal away from the shaft until the dust has settled.

Most of the mine locomotives used at present are powered by diesel engines but it is thought that battery locomotives may come into more general use because of their relatively low maintenance cost. Hitherto they have not been made in large enough units in this country for main haulage work but one of 90 h.p. was recently installed and is giving satisfactory service. The trolley-wire system installed at a Lancashire colliery last year as an experiment is said to be working well and the four locomotives on this system are together hauling about 1,300 tons of coal a day over a distance of 1½ miles.

An electro-gyro locomotive is now being tried out on the surface at one colliery to find out if there is any chance of using it underground. The idea of using the kinetic energy of a flywheel to propel a vehicle is not new but hitherto it has been applied mainly in children's toys. This locomotive is fitted with two flywheels 5 ft. 3 in. in diameter which run at a maximum speed of 3,000 r.p.m. in a casing partially filled with hydrogen for cooling purposes. The flywheels are run up to full speed by a change-pole squirrel cage induction motor supplied with current from any convenient point on the power supply system. The motor is then driven by the flywheels as a generator to supply current to the traction motors and for this purpose it is excited by a battery. No information is given in the paper about the range of action of the locomotive but it is of interest to note in this connection that the flywheels used for equalizing the load on electric winders give out from 1 to 1.5 h.p. seconds per pound weight when their speeds are reduced by about 15 per cent.

Small lorries powered by flame-proof diesel engines are to be used at some mines for the transport of supplies and materials on conveyor roadways without rail tracks.

MECHANIZED UNITS IN OPERATION

The mechanization of longwall faces is a very intractable problem and no general solution is likely to be found in view of the widely varying conditions met with in the coalfields. Mr. Brown gave brief descriptions of the following cutting and loading machines which are now undergoing trials. The figures in brackets refer to the numbers in use: Meco-Moore cutter loader (115), Andreson Disc Shearer (3), Gloster Getter (?), Joy Continuous Miner (6), Dosco Continuous Miner (1), Schramhobel or Step-Knife Plough (12), Lobbehobel or High Speed Plough (12), Scraper Box Loader (4), Gusto Multi-Plough (Dutch, 5 on order), Huwood Sliver (2), Anderson Boyes Trepanner (2), Mavor and Coulson Multi-Jib Cutter (2), American Auger (1). The Meco-Moore machines may be said to have passed beyond the experimental stage, as is suggested by the numbers in use. Their combined output last year amounted to about 7,500,000 tons or about 3 per cent of the country's total output.

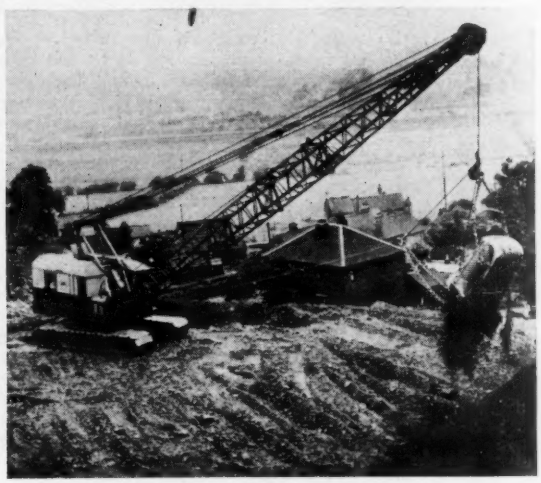
The armoured flexible conveyor is regarded as the key to power loading with several types of machines, including ploughing, and British makes are being developed and improved. A report is to be published shortly on the results of tests which have been carried out on a number of other conveyors imported from Germany and elsewhere.

Power stowing is also a problem which is proving rather difficult and progress with pneumatic and dynamic methods has been slow. A great deal of development work remains to be done on the machines themselves and on the techniques of using them.

MACHINERY AND EQUIPMENT

Replacement Power Unit for Excavators

Since its introduction in 1951, the 6 cylinder model of the C range of Rolls-Royce oil engines has been utilized as the power unit for several types of earthmoving equipment, in particular as the C6SFL model, the power unit for the VR 180 tractor. As the application of the C range, consisting of 4, 6 and 8 cylinder models, becomes more widespread amongst earth-moving equipment manufacturers, users will benefit considerably from the obvious advantages of several engines of different h.p., but having the same basic design and a majority of interchangeable parts.



The Lima 802 with 70 ft. dragline boom and 2 cu. yd. bucket

A recent application which promises to be of considerable assistance to civil engineering contractors, has been the adaptation of the 6 cylinder model for use in a Lima 802 excavator. This unit is an American built excavator, a number of which were imported into the United Kingdom by Jack Olding and Co. Ltd., the distributors. Originally these machines were supplied with Caterpillar D 17000 or General Motors 6030 C engines, and fitted with 2 cu. yd. face shovels, 2 cu. yd. dragline buckets or crane front end equipment. The technical division of Jack Olding, in collaboration with Rolls-Royce, has investigated the possibility of adapting a 6 cylinder oil engine as a complete power pack suitable for replacement in existing excavators.

The supercharged 6 cylinder Rolls-Royce oil engine is rated at 176 b.h.p. at 1,600 r.p.m., this figure may be considered as a conservative one, but quite sufficient for the operation of the Lima 802. The high running speed—a characteristic of the C range of oil engines—necessitated a reduction gear box of a ratio 1.41:1. The engine, together with its accessories, is virtually identical to the one used in the Vickers VR 180 tractor incorporating a dry sump with oil and water heat exchanger, three large full flow oil filters, triple fuel filters, C.A.V. fuel injection system and Simms electric starter and dynamo.

Safety Appliances for Mining Operations

Those safety appliances which form part of the individual equipment of the underground worker, as distinct from the engineering appliances fitted to mining machinery of all types, are the subject of a comprehensive handbook published by Siebe, Gorman and Co. Ltd. This equipment embraces self-contained oxygen breathing apparatus as well as protective equipment of all necessary applications.

Among the self-contained breathing apparatus produced by the manufacturers is the Proto Mark IV equipment, which is designed purely to supply the wearer with a fictitious but respirable air for up to one or two hours' duration and independent of any communication with outer atmosphere. Its use is therefore particularly applicable to the mining industry. The apparatus consists of a steel oxygen cylinder containing oxygen compressed to not less than 120 atmospheres, with which various valves are incorporated. The breathing bag is of strong vulcanized india-rubber designed to prevent the CO_2 absorbent from moving laterally in case the wearer may be working on his side. Other pieces of this unit include the mouthpiece and noseclip, eye protecting goggles, head harness and carrying equipment.

The Salvus unit is constructed on the same regenerative principle as the Proto, but is a half-hour self-contained oxygen breathing apparatus, as is the Fireox unit. Other self-contained oxygen breathing equipments include the Lungovox, Savox, Amphibian Mark IIA, and the Siebe, Gorman units Mark I, II and III.

Other safety equipment manufactured by the company includes smoke masks, gas and dust masks, resuscitation apparatus, protective apparel for head and eyes, as well as arm and leg protection units, body protection units, fire extinguishers and first-aid outfits.

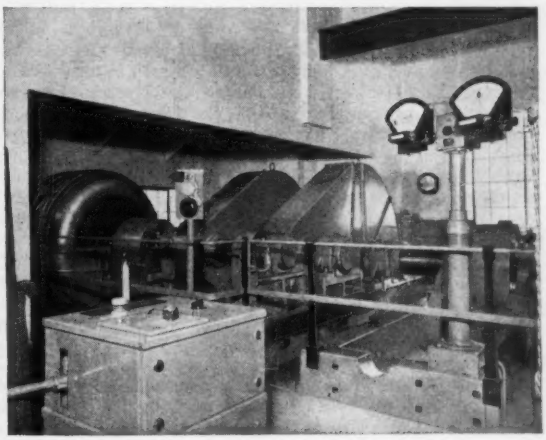
Miners' helmets must meet requirements of strength, lightness, durability and comfort, and these have been prime considerations in the design and manufacture of Siebe, Gorman equipment. Safety helmets for underground and opencast use are constructed of aluminium and plastics, and may be supplied with or without lamp bracket. In addition, a helmet named the Cool Cap is prepared from treated fibre of great strength and is designed to provide adequate ventilation.

Protective boots are manufactured with internally fitted steel toe caps, while hose reels, portable fire and general purposes pumps, together with fire extinguishers, make up a comprehensive range of safety equipment.

A.C. Slant Haulage with Dynamic Braking

The largest A.C. slant haulage in the South Wales coalfield to be equipped with dynamic braking has recently been commissioned at the Pantyffynnon Colliery, near Ammanford.

The Pantyffynnon haulage was formerly driven by a reciprocating steam engine, which the N.C.B. has replaced with a modern electric drive. The winder drum of the original haulage



Winder house at Pantyffynnon Colliery with control desk in foreground

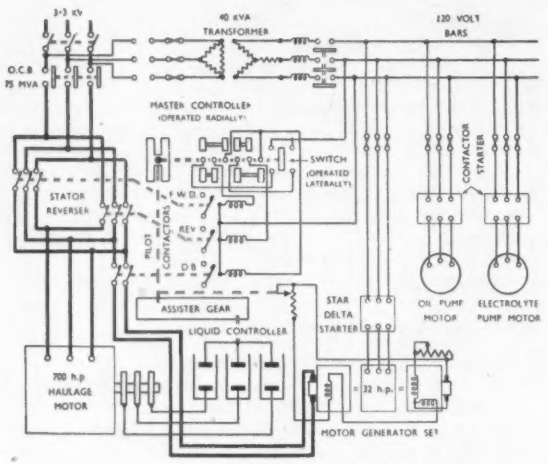
has been retained, and is now driven through reduction gearing by a reversible A.C. slipring motor rated at 700 h.p. r.m.s. The electrical plant and control gear for the new drive was supplied by The General Electric Co. Ltd.

The total length of the Pantyffynnon haulage is 1,000 yd. over gradients ranging from 1:2.1 to 1:5.5, and the maximum load comprises 11 trams with a total deadweight of 17 tons. The normal duty cycle provides for seven journeys per hour at

a maximum rope speed of 12½ m.p.h., representing a total of 475 tons of coal raised per 8-hour shift. When used for man riding, the maximum rope speed is limited to 6¼ m.p.h.

The electrical plant comprises the main haulage motor, a motor-generator set which provides the D.C. supply for dynamic braking, and two 220-volt motors which drive the assister gear and electrolyte pumps for the liquid controller.

The main switchgear consists of a 2-cubicle 3.3 kV. switchboard fitted with an oil circuit breaker of 75 MVA. rating for controlling the supply to the winder motor; and H.R.C. fuses for controlling the supply to the 40 kVA. auxiliary transformer. The main haulage motor is a 3.3 kV. reversible slipring machine of the screen-protected type rated at 700 h.p. at 365 r.p.m., and is fitted with two pedestal journal bearings. The 3.3 kV. switchboard is fitted with independent air-break isolators for the haulage motor and the auxiliary transformer, while the stator reverser is of the air-break type with sections for forward, reverse winding and dynamic braking, and the liquid controller is of the electrode weir type in which the moving electrodes form a weir to retain or release the electrolyte in the three insulated electrode chambers.



Schematic diagram of installation

The servo unit consists of a fixed piston with a moving cylinder which carries a toothed rack. This rack engages with a quadrant to which is connected a lever which in turn operates the controller. The unit controls the rate of acceleration, and co-ordinates rotor resistance with excitation during dynamic braking. The driver's control lever operates in an H gate; when it is in the neutral position movement to the left emergises the appropriate contacts in the master controller for forward winding and dynamic braking. On moving the lever forward from the neutral position the appropriate A.C. stator contactors are closed and the winder motor accelerates, at a rate determined by the servo mechanism of the liquid controller, to a speed which is fixed by the position of the control lever. Movement of the control lever backwards from the neutral position disconnects the stator of the haulage motor from the 3.3 kV. supply and connects one phase of the stator winding to the D.C. supply from the dynamic braking M.G. set. The degree of braking is then controlled by the position of the control lever, which is mechanically coupled to the dynamic braking regulator.

Dorman Long Order New Structural Steel Mill

The United Engineering and Foundry Company, America, a major builder of steel mills, has announced that it has received an order from Dorman Long and Company for a wide flange beam and structured steel mill. Much of the equipment will be built in the United Kingdom and all the electrical equipment will be purchased from British manufacturers. United Engineers will supervise the building of the mill and will furnish all engineering plans. The company said that the Middlesbrough mill would be designed and built to give Dorman Long a maximum variety of rolled steel products.

REVIEWS

Kempe's Engineer's Year Book, 1954, Vols. I and II.—*Fifty-ninth edition. Edited by C. E. Prockter, M.I.E.E., M.I.Mech.E., under the direction of B. W. Pendred, M.I.Mech.E., M.I.S.I. Published by Morgan Brothers (Publishers) Ltd. Vol. I. pp. 1,345; Vol. II pp. 1,413 with index. Illustrated. Price, two volumes in case, 75s., plus postage.*

This fifty-ninth edition of *Kempe's Engineer's Year Book* is presented by the publishers as an almost entirely new work. Various changes have been made in typeface and make-up, and almost every chapter has been heavily revised. Additions in keeping with modern trends are chapters on Atomic Power, Industrial Safety, Mechanical Handling and Powder Metallurgy amongst others, while new headings have been devised in accordance with changed methods of dealing with old subjects.

The subjects covered in these comprehensive volumes naturally embrace all facets of engineering study, and many, apart from that section devoted fully to mining engineering, will be of interest to the mining engineer. Such sections include those concerned with mechanics, vibration and noise, electrical fundamentals, hydraulics, the theory of structures, engineering materials, timber, machine tools, cableways and mechanical handling to name but a few. Indeed, it is difficult to by-pass any section of the volumes as having no interest whatever to the underground official or mining engineer.

The section of Volume II devoted to mining engineering, in keeping with the remainder of the matter published in these volumes, is remarkably comprehensive. The section as a whole includes full notes on the classification of mineral deposits, mining legislation, the National Coal Board, systems of mining, shafts, sinking processes, ground control and support, valuations, and the preparation of ores, together with other subjects which together constitute a valuable handbook within a book. Machinery notes are of current tone, and the well-known work is of definite value that enhances the considerable reputation established by its predecessors.

Mining and Industrial Year Book of Australia, 1953.—*Eighth Edition. Published by Paterson Brokensha Pty. Ltd. Pp. 184 with illustrations.*

Dealing with all aspects of the Australian mining industry, this eighth edition of *Mining and Industrial Year Book* covers developments in each State of the Commonwealth last year, the whole bringing a note of optimism in the future of Australia's mineral industry. This hopeful outlook has been aided by a reduction of taxation for Australian mining companies.

The Year Book contains interesting articles on rubber and its applications in the mining industry, the selection of electric motors and starting equipment, as well as notes on aspects of gold marketing. Hydraulics and trends in the uses of machinery units completes the good cross-section presented by the article section.

The section devoted to references as a mining directory presents current data on coal, gold, iron, silver, tin and lead producing companies operating in Australia, the Malay States, Fiji and New Zealand. A useful book.

Electrical Engineering for Mining Students, *by G. M. Harvey, M.Sc., B.Eng., M.I.E.E. Published by Sir Isaac Pitman and Sons Ltd. Pp. 157 with illustrations and index. Price 15s. net.*

The volume under review constitutes the second edition (1954) of a valuable handbook first published in 1926. The object of the present edition is to present to the mining student an introduction to the theory of electrical engineering, for, as the author points out in a preface, "Electrical theory does not change with the years, but there have been many developments of electricity in the application of electricity to mining during the intervening period."

The work discusses in turn elementary principles, the dynamo, direct-current motors and the alternating current circuit, transformers, alternating and polyphase currents, alternating current motors, motor-generators, converters and rectifiers. It is well and clearly illustrated throughout and presents a clear and concise description of the matter it imparts.

METALS, MINERALS AND ALLOYS

The major metals have generally shown a rise in price this week led by tin. On the other hand, there appears to be increasing supplies of metal coming into sight which make the price rise look somewhat in the air. Much must, of course, depend on the course of industrial activity in the States and we are now at the critical period when spring buying should begin to make itself felt and when, if the hoped for reactivation of the American consumer does not make its appearance, President Eisenhower has told us that he intends to take steps to prime the pump. Obviously if the generally admitted trade "recession" gains strength it will be another weapon for the Democrats in the campaign for the mid-term elections in the autumn.

The British Metal Corporation has resumed its series of annual reports after 15 years' intermission. In its review, published this week, it points out that copper is around £230 per ton against £46 in 1948; lead over £80 against £15; zinc over £70 against £14; and tin £650 against £190. Like the A.S. and R. it points out that the combination of supply and demand portents looks distinctly "bearish" and has done so for some months past, yet prices have kept up. Among other reasons for this are that stockpile objectives, notably for copper, are still some way from fulfilment and that at present the big American producers are apparently willing to continue carrying heavy stocks to support prices.

COPPER.—An advance of ¼ c. per lb. for refined by U.S. customs smelters was posted at the end of last week (the first change since October 20), making the current price 29¼ c., but the price is still slightly under last week's close on the Metal Exchange. The American Smelting and Refining Company in their report to shareholders point out that stocks of refined in producers' hands practically doubled last year, at approximately 370,000 s.tons, and that this, combined with a substantial increase in world capacity now beginning to come into production, has laid the foundations for the widely predicted world decline in prices which has still to make its appearance.

Attention has been largely centred this week on the situation in Chile. The appointment there of a new Minister of Mines, Señor Roberto Aldunate, appears to have been attended with more positive action. The American-owned companies, Braden, Chuquicamata, and Potrerillos, petitioned recently to be allowed to reduce their production by about 30 per cent. This petition was rejected "for the time being" pending a survey to be undertaken, but the Chilean Government is understood to insist that American-owned companies must first prove that they have proportionately reduced their ouputs in plants outside Chile. After this has been done the companies must show that there is no alternative but to cut their Chilean production. While Kennecott could possibly meet this requirement, Anaconda, with a domestic output of close on 100,000 tons per year, has so far only reduced by about 8,400 tons.

The Minister of Mines is further reported as saying that if, after exhaustive studies, the Government should consider a reduction in present output necessary, they would consider purchasing the mines. In view of the difficult financial situation this suggestion seems reminiscent of the Bolivian nationalization of their mines. The Ministry also denied that the dismantlement of installations asked for by Braden would be permitted without Government authorization. This is in line with the policy adopted earlier with the nitrate properties.

Meanwhile, Señor Aldunate continues to speak in a highly optimistic, if slightly unintelligible, tone. He is reported from Santiago as saying that all, or part, of Chile's copper stocks will be sold this week as a result of direct negotiations with the U.S. Government (according to Washington 100,000 tons are involved and negotiations are unlikely to be concluded this week) and that the U.K. is "interested" in buying a total of 100,000 tons of future production. A day or two earlier the Ministry of Mines stated that the U.K. was expected to buy up to 3,000 tons. The total Chilean accumulated stock is now reported at 180,000 tons.

LEAD.—There has been a brighter tone in lead both here and in the United States where the New York quotations for spot have been raised to 13 c. per lb., a gain of ¼ c. This will seem mainly to have been a reflector of the London price, and consumer demand has not apparently eased off to an extent following the news. It is worth noting that there has been a sharp improvement in quotations on the Commodity Exchange where business was reported as somewhat over the regular New York market. Consumers, too, are ordering for prompt and early deliver on a flat price basis.

TIN.—It was announced from Washington at the week-end that the United States would not sign the International Tin Agreement. This is in line with the recent rejection of the scheme by U.S. consumers. However, the official announcement added that the U.S. Government would hold off the market its excess supplies of metal estimated at from 38-40,000 tons. These would be held in "insulation" unless the President directed otherwise. This decision is construed as a compromise between the foreign political objectives of the Administration and the dislike of U.S. consumers to any restrictive agreement.

Mr. J. T. Chappel, President of the F.M.S. Chamber of Mines, said that the American decision did not necessarily mean that the tin agreement could not become operative, provided it was ratified by the requisite number of other consumer and producer countries, but it could not function effectively without American goodwill and support. American abstention implies a redistribution of votes among consumers as the United States would have had the total of 490 votes out of a total of 1,000. The British Government have signed the new agreement, while Germany, France, Canada, The Netherlands, India, Italy and Japan have still to notify their approval, but they are expected to adhere. The agreement is open for ratification up to June 30 next. The scheme can hardly be in thorough working order however till towards the end of the year, even if all goes smoothly.

There is still no news regarding the terms of the purchase, if any, of Indonesian tin by the U.S. While this would seem to be necessary if the Texas smelter is to remain in operation in order to sweeten the low grade ore or refractory Bolivian concentrates, there is no obvious snag in the United States electing to purchase metal smelted in Holland or elsewhere should the smelter be closed.

The market took a bright view of the United States refusing to come in coupled with the promised retention of the excess stocks "in insulation," and prices were advanced to around £705 for cash this week, the highest reached since last June. There was a corresponding advance in the U.S. to 90.25 c.

ZINC.—The U.S. zinc price this week recorded its first increase for well over a year, rising on Wednesday by ½ c. to 9¼ c. for spot metal. It really begins to look as if the price may have grounded at last and that the cutbacks in domestic production are beginning to make themselves felt, at any rate in anticipation. No doubt the stronger tone in zinc was assisted by the publication this week of the February slab zinc statistics of the American Zinc Institute, which for the first time since last May showed production (68,020 s.tons) and shipments (66,738 s.tons) approximately in balance. In consequence the stock figures have for the moment ceased to spiral and at 199,994 s.tons on February 28 were only about 1,000 s.tons up on the beginning of the month.

QUICKSILVER.—Quotations for domestic delivery of quicksilver have been advanced in New York to $193/195 compared with $188/191.

TUNGSTEN.—As foreshadowed in this column three weeks ago, the U.S. has now formally refused to renew the agreement whereby Korean tungsten was sold exclusively to the States. Under the agreement, which expires at the end of this month, Korea has been selling the States about 15,000 s.tons of tungsten a year. The South Korean Government has now to seek buyers elsewhere and it remains to be seen what effect the impact of this additional tonnage will have on world markets.

In anticipation of the resumption of private trading on April 1, the Board of Trade now invites applications for import licences from all countries other than from a long list of North and South American states, together with French Somiland,

Haiti, Liberia, the Philippines and Tangier, which are presumably all excluded on account of currency difficulties. Export licencing arrangements are to remain unchanged at present.

Iron and Steel

Five years have elapsed since "the level and structure" of steel prices were subjected to a general review. The Iron and Steel Board has now embarked upon a further consideration of the effect of increased railway rates and changes in other costs of production which may not be completed for some time to come. In the meantime, steel makers must absorb rises in freight charges, in the cost of pig iron and also an advance in scrap prices. This latter which came into force on Monday last is strictly limited. Authorized advances in the controlled maximums home prices of ferrous scrap range from 2s. 1d. to 4s. per ton and represent no more than the carefully calculated advance in transport charges.

Meanwhile, export premiums on British steel have been considerably reduced to counter the intensified competition of the European Cartel and in the case of semi finished steel have been eliminated entirely.

The latest move of the High Authority is to present to the Advisory Committee and the Council of the European Coal and Steel Pool a proposal to end scrap price control within the Pool and to consolidate the price equalization scheme for imported scrap.

Much in the same way as in this country, the extra cost of imported material is financed by a levy on every ton of home produced ingots. Scrap buyers in the countries affiliated to the Pool pay a voluntary levy towards the Equalization Fund which is used to reduce the effective price of imported scrap. In its operation the levy chiefly benefits Italy which receives by far the largest proportion of the scrap imported by the Pool. It is now proposed to make the levy compulsory but this can only be done with the consent of the Council or Ministers which has yet to be obtained.

The London Metal Market

(From Our Metal Exchange Correspondent)

With the news that America will not sign the International Tin Agreement but will maintain a benevolent neutrality, and that the British and the Bolivians are prepared to sign, the tin picture becomes a little clearer. The Americans have made it quite clear that they will do nothing to swamp the initial operations of a buffer pool, and have implied that they hope the Agreement will be brought into force. The crux of the matter now appears to be whether sufficient countries classed as consumers will agree that the attempt should be made to stabilize tin prices at a level which, it must be admitted, will be higher than if the law of supply and demand operates freely, and it is considered there is a good chance that the advantages of a relatively stable price will outweigh the disadvantages of violent fluctuations. On the London market the news has brought a substantial rise in the price level and many people expect to see this continue, but it must be borne in mind that many months will elapse before a buffer pool can start to operate, and that as producers are unlikely to take any steps to curtail production whilst the market remains firm there is a considerable surplus of tin being built up, all of which will not be able to find a home in the buffer pool stock. On Thursday morning the Eastern price was equivalent to £694¼ per ton c.i.f. Europe.

The copper market has remained firm with good demand, and with near metal still difficult to obtain, the prices for shipment during the next three months remain close to the 30 c. per lb. mark. There has been a little more interest in forward copper as many consumers on the Continent now feel that a recession in the price is unlikely before midsummer, and therefore use should be made of the existing backwardation. Unfortunately, in this country order books in general are not sufficiently long to enable the same advantage to be taken of the situation. If, as is rumoured, the Chileans are able to get rid of the majority of their stocks to the United States they will be able to control the rate at which they sell their copper for some months to come, and with the demand for scrap remaining at its present high level there seems little chance of any recession in price before the summer. At the same time, however, it is believed that producer interests are anxious to prevent any rise in the price level, as it is felt that this might curtail consumer demand.

The lead price has been strong on the realization that the tonnage of metal likely to arrive in this country during the next few weeks will be barely sufficient to cover requirements, and this state of affairs may continue if the present increased American demand absorbs some of the lead which has been coming to the London market in recent months. Consumer demand, however, has been disappointing after the rise in the U.K. and U.S. prices.

The zinc market has remained relatively unaffected by the rise in the other prices, and by the news that for the first time for many years American production and consumption during February were almost in balance, as consumers showed no increased interest and dealers were mindful of the very large stocks existing in America, some of which would doubtless start to move in this direction if the price went up to any appreciable extent.

	March 4		March 11	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£690	£692½	£712½	£715
Three months	£663	£664	£685	£686
Settlement	£692½		£715	
Week's turnover	680 tons		755 tons	
Lead				
Current month	£83	£83½	£88	£88½
Three months	£82½	£82¾	£87½	£87½
Week's turnover	2,750 tons		6,575 tons	
Zinc				
Current month	£72½	£72¾	£73	£74
Three months	£71¾	£71½	£72¾	£73
Week's turnover	2,225 tons		6,450 tons	
Copper				
Cash	£238	£239	£239	£241
Three months	£223¾	£224	£227¾	£228½
Settlement	£239		£241	
Week's turnover	4,675 tons		5,000 tons	

OTHER LONDON PRICES — MARCH 11

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. £210 per ton
Crude (70%) .. .. .. £200 per ton
Ore (60% basis) .. .. .. 22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, 99·5% £156 per ton
Bismuth (min. 4 cwt. lots) 16s. lb.
Cadmium (Empire), 13s. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £60 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) £225/£262
Osmiridium, £40 oz. nom.
Osmium, £65/£70 oz. nom.
Palladium, £7 14s. oz.
Platinum, £30/£33
Rhodium, £42 10s. oz.
Ruthenium, £25 oz.
Quicksilver, £70 10s./£71 ex-warehouse
Selenium, 30s. 6d. nom. per lb.
Silver 73¾d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 30% 5s. lb. c.i.f.
20% 3s. 3d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 5s. 6d. per ton c.i.f.
,, ,, (concentrates) £14 5s. 6d. per ton c.i.f.
,, ,, Refractory £13 17s. 6d. per ton c.i.f.
Baluchistan Metallurgical .. £15 19s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 102s. 4d. - 103s. per unit c.i.f.
Wolfram (65%) .. .. .. World buying 107s. 6d. nom.
,, ,, ... 120s. U.K. Selling
Scheelite (65%) .. .. .. World buying price 120s. nom.
,, ... 115s. U.K. Selling
Tungsten Metal Powder (98% Min. W.) .. .. 12s. 3d. nom. per lb. (home)
Ferro-tungsten .. .. .. 9s. 3d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. .. £53 10s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46% - 48%) .. .. .. 7s. 4d. - 7s. 9d. per unit
Brass Wire .. .. 2s. 4½d. per lb. basis
Brass Tubes, solid drawn .. 1s. 8¾d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The recovery in gilt-edged was supported by improved revenue figures and more rumours of a reduction in the bank rate before long.

Kaffirs survived the settlement of the long account well. Among finance houses, General Mining improved following favourable press comments on its merits as an investment and other leaders recorded fractional gains. Consolidated Mines Selection were easier despite the higher profit figures due to the chairman's hint that a small capital issue might be raised in the near future. In considering this group it should be remembered that share trading profits form an important part of a finance house's earnings and for this reason the current year can reasonably be expected to be satisfactory.

Movements in individual Rand mines were, to some extent, dictated by the February returns. For this reason, Doornfontein improved and many of the older mines also rose on hopes raised by the better labour figures. Dominion Reefs fell on profit-taking after the recent sharp rise. Vaal Reefs hardened in front of the new capital issue announcement. The company is to raise the sum of £3,500,000 by a share issue; details will be issued later. It is understood that the money will be used for shaft sinking and underground development. A production plant will also be erected and the consulting engineers have recommended that an application be made as a uranium producer.

There was again considerable interest in the Orange Free State. Free State Geduld were the focal point both in London and Johannesburg, and a further sharp rise occurred. Other issues were quieter, but prices were well maintained. Welkom staged a recovery and St. Helena went ahead sharply. President Steyn will pour its first bar of gold on April 3. The South African budget, due on March 24, can be expected as an increasing factor in markets from now on, but the recent shake up in O.F.S. issues is generally considered to have been technically healthy.

West Africans were rather quiet but the Ashanti recovery was maintained and Ariston were the turn higher on the better results. Both companies will without doubt feel the loss of premium revenue during the coming year. The unhappy recent history of Nanwa is now almost concluded with the appointment of receivers. The ordinary shareholders will receive nothing.

Diamond shares were again a sound market recording good all-round gains; Platinums, however, turned easier.

Coppers were much happier despite the easier metal price. Chartered were again to the fore on strong investment buying. The company has a considerable advantage over producers in that its income is based on royalties and is not affected by higher working costs. A good improvement occurred in all other leading shares in this group. Esperanza also hardened after the close of the new share lists.

Eastern tins shares continued last week's upward movement. The big rise in the cash price of tin, following on the International Agreement, caused a sharp rise in the leading shares. The strong cash position of some of the companies has received favourable comment in the financial press. Renong rose sharply to 11s.; the company has had good results and is understood to be working exceptionally rich ground. The British Malayan Tin Syndicate has gone into liquidation. Their Cornish venture has failed and it is understood that there are no assets left.

Nigerian tins were all better but as many of the leading producers are concentrating on columbite production the rise was less marked than in the previous section. Nevertheless, if the metal price is maintained, working costs on the leading properties should be amply covered.

Firmer metal prices caused an improvement in lead/zinc shares, and in the miscellaneous base metals section Consolidated Murchison, Central Provinces Manganese, and asbestos shares were outstanding.

FINANCE	Price Mar. 10	+ or — on week
African & European	2½	+ 1/32
Anglo American Corpn.	6⅛	+ ⅛
Anglo-French	19/-	—1/6
Anglo Transvaal Consol.	25/-	.....
Central Mining (£1 shrs.)	29/-	—3d
Consolidated Goldfields	48/9	—7½d
Consol. Mines Selection	29/4½	—1/10½
East Rand Consols	3/6	—1½d
General Mining	4 3/32	+ 1/32
H.E. Prop	38/9	.....
Henderson's Transvaal	8/3	.....
Johnnies	48/6	—10½d
Rand Mines	3 7/16	.....
Rand Selection	34/9	+4½d
Strathmore Consol.	35/-	.....
Union Corp. (2/6 units)	30/3	—3d
Vereeniging Estates	4⅛	— 1/16
Writs	33/9	.....
West Wits	39/4½	+7½d
RAND GOLD		
Blyvoors	33/-	—3d
Brakpan	9/3	+3d
City Deep	18/9	.....
Consol. Main Reef	18/9	.....
Crown	40/7½	+7½d
Daggas	3⅛	+ 1/32
Doornfontein	27/1½	+1/7½
Durban Deep	35/7½	+7½d
E. Daggas	14/-	+9d
E. Geduld .. (4/- units)	28/9	+2/6
E. Rand Props	2 11/32	.....
Geduld	3⅛	+ ⅛
Govt. Areas	12/10½	+7½d
Grootvlei	20/9	+9d
Libanon	10/3	+4½d
Luipaards Vlei	23/9	.....
Marievale	18/3	.....
Modderfontein East	13/9	.....
New Kleinfontein	15/7½	.....
New Pioneer	16/3XR	.....
Randfontein	68/-	.....
Robinson Deep	15/3	+6d
Rose Deep	14/4½	.....
Simmer & Jack	4/10½	+4½d
S.A. Lands	25/-	+2/6
Springs	5/1½	.....
Stilfontein	26/6	+3d
Sub Nigel	40/7½	+1/3
Van Dyk	5/-	—1½d
Venterspost	13/3	+6d
Vlakfontein	14/9	.....
Vogelstruisbult	37/3	—3d
West Driefontein	5½	+ 1/16
W. Rand Consolidated	2 3/16	.....
Western Reefs	2 3/32	+ 1/32

O.F.S.	Price Mar. 10	+ or — on week
Freddies	9/-	—3d
Freddies N.	10/3	—6d
Freddies S.	9/4½	—1½d
F. S. Geduld	5 1/32	+ 1/8
Geoffries	15/3	—9d
Harmony	29/9	—3d
Loraine	12/4½	—4½d
Lydenburg Estates	17/3	.....
Merriespruit	11/-	+1½d
Middle Wits	15/-XR	+3d
Ofsits	2 11/32	+ 1/32
President Brand	52/3	—3d
President Steyn	32/9	—3d
St. Helena	23/4½	+3/1½
Virginia Ord.	14/3	+6d
Welkom	19/9	+2/-
Western Holdings	4 13/32	+ ⅛
WEST AFRICAN GOLD		
Amalgamated Banket	1/7½	.....
Ariston	5/9	+1½d
Ashanti	19/6XD	+6d
Bibiani	4/-XD	—1½d
Bremang	2/1½	.....
G.C. Main Reef	3/6	+1½d
G.C. Selection Trust	6/6	+3d
Konongo	2/4½	+1½d
Lyndhurst Deep	1/-	.....
Marlu	1/6	.....
Taquah & Abosso	2/4½	.....
AUSTRALIAN GOLD		
Boulder Perseverance	3/-	.....
Gold Mines of Kalgoorlie	13/6	.....
Great Boulder Prop.	8/7½	+1½d
Lake View and Star	13/9	+6d
Mount Morgan	18/6	+3d
North Kalgurli	6/9XD	+6d
Sons of Gwalia	5/6	—3d
South Kalgurli	6/9	.....
Western Mining	11/9	+3d
MISCELLANEOUS GOLD		
Cam and Motor	9/3	.....
Champion Reef	4/7½	+1½d
Falcon Mines	7/9	+3d
Globe & Phoenix	23/-	.....
G.F. Rhodesian	5/6	—3d
London & Rhodesian	4/6	.....
Motapa	2/6	+3d
Mysore	4/7½	+1½d
Nundydroog	5/9	.....
Ooregum	3/6	.....
Oroville	16/9	+1½d

MISCELLANEOUS GOLD contd.)	Price Mar. 10	+ or — on week
St. John d'El Rey	19/6	.....
Zams	32/3	.....
DIAMONDS & PLATINUM		
Anglo American Inv.	4⅛	+ 1/32
Casts	23/6	+3d
Cons. Diam. of S.W.A.	5	+ ⅛
De Beers Defd. Bearer	81/9	+3d
De Beers Pfd. Bearer	16¼	+ ¼
Pots Platinum	8/1½	—7½d
Watervaal	12/6XD	—1/3
COPPER		
Chartered	65/3	+ 1/-
Esperanza	7/9	+4½d
Indian Copper	4/6	—1½d
Messina	4	+ 1/32
Nchanga	6 3/8	+ 1/32
Rhod. Anglo-American	52/3	+3/3
Rhod. Katanga	14/3	+9d
Rhodesian Selection	15/-	+9d
Rhokana	18¾	+ ⅛
Rio Tinto	22¼	+2½
Roan Antelope	15/1½	+4½d
Selection Trust	36/10½	+7½d
Tanks	61/9	+3d
Tharsis Sulphur Br.	51/3	+1/3
TIN (Eastern)		
Ayer Hitam	25/9	+1/-
Gopeng	8/6	+9d
Hongkong	6/9	.....
Ipoh	15/6	+3d
Kamunting	8/6	+1½d
Kepong Dredging	4/9	+3d
Kinta Tin Mines	10/9	+4½d
Malayan Dredging	26/6	+9d
Pahang	13/6	+1/1½
Pengkalan	7/7½XD	+4½d
Petaling	8/4½XD	+4½d
Rambutan	13/-	+6d
Siamese Tin	8/1½	+3d
Southern Kinta	15/-XD	+6d
S. Malayan	25/-	+1/3
S. Tronoh	8/3	+4½d
Sungei Kinta	10/6	+1/-
Tekka Taiping	5/6	.....
Tronoh	23/-	+1/3
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	14/7½XD	+1½d
Beralt Tin	20/-	+3d
Bisichi	6/1½	+1½d
British Tin Inv.	14/1½XD	+1/4½
Ex-Lands Nigeria	2/10½	+1½d

TIN (Nigerian and Miscellaneous) contd.	Price Mar. 10	+ or — on week
Geevor Tin	10/9	+10½d
Gold & Base Metal	3/7½	+4½d
Jantar Nigeria	8/10½	+4½d
Jos Tin Area	13/3	+6d
Kaduna Prospectors	2/3	+1½d
Kaduna Syndicate	2/1½	+1½d
London Tin	5/10½	+1½d
United Tin	3/9	+4½d
SILVER, LEAD, ZINC		
Broken Hill South	2⅛	+ 1/32
Burma Mines	2/4½	—3d
Consol. Zinc	29/-	+1/3
Lake George	6/4½	+4½d
Mount Isa	32/3	—3d
New Broken Hill	23/3	+1/-
North Broken Hill	2⅛	+ 1/32
Rhodesian Broken Hill	9/1½	+3d
San Francisco Mines	17/9	+3d
Uruwira	3/7½	+1½d
MISCELLANEOUS		
BASE METALS & COAL		
Amal. Collieries of S.A.	41/6	.....
Associated Manganese	44/-	—2/3
Cape Asbestos	24/9	+1/1½
C.P. Manganese	58/-	+1/9
Consol. Murchison	40/-	+7½d
Mashaba	3d	.....
Natal Navigation	2 13/32	+ 1/8
Rhod. Monteleo	1/9	.....
Turner & Newall	75/3	+2/9
Wankie	13/1½	.....
Witbank Colliery	3 13/16XD	.....
CANADIAN MINES		
Dome	$28⅜	—¼
Hollinger	$26XD	.....
Hudson Bay Mining	$76½	+1
International Nickel	$67½	—⅛
Mining Corpn. of Canada	£4	.....
Noranda	$119	+2
Quemont	£5½	+½
Yukon	3/9	.....
OIL		
Anglo-Iranian	10 13/16	+ 1/32
Apex	45/-	+7½d
Attock	42/6	+4/4½
Burmah	75/-	+4/-
Canadian Eagle	28/7½	+1½d
Mexican Eagle	20/6	+9d
Shell (bearer)	5 1/16	+ 1/32
Trinidad Leasehold	20/-	+7½d
T.P.D.	25/-	.....
Ultramar	27/-	—4½d

COMPANY NEWS AND VIEWS

Rand and O.F.S. Returns for February

The generally lower profits announced by the Rand and O.F.S. gold producers for February were, in most cases, attributable to the shorter working month during which gold revenue was based on a price of 248s. per oz. compared with 248s. 2d. in January.

The most interesting item of news concerns Randfontein which reported that its uranium plant had commenced operations. This fact was announced at the extraordinary meeting of East Champ d'Or, which has already begun to pump uranium-bearing slimes to Randfontein. West Rand Consolidated on its gold mining account showed further declines in mill throughput, gold production and working profit, although working costs per ton milled dropped by 2d. to 30s. 4d.

Luipaards Vlei in a circular to shareholders stated that the company had unwittingly been acting incorrectly in making deductions from non-resident shareholders' dividends and accordingly it has stated that repayments of the amounts due will be made to all those who held the shares at the times the various dividends became due and from which the deductions of non-resident shareholders' tax were made. Warrants, together with an explanatory circular, will be sent to all concerned on or about April 1.

Company	February, 1954 Tons (000)	Yield (oz.)	Profit (£000)	Yr. ends	Current Financial Year Total to Date Tons (000)	Yield (oz.)	Profit (£000)	Last Financial Year Total to Date Tons (000)	Yield (oz.)	Profit (£000)
Gold Fields										
Doornfontein	47	14,097	57·7	J	179	51,931	158·5	—	—	—
Libanon	90	18,577	50·3	J	695	141,976	363·7	656	131,193	333·6
Luipaards Vlei	109	20,308	41·5	J	846	156,848	324·5	808	152,428	390·4
Rietfontein	26	5,965	23·2	D	53	11,974	46·6	51	11,459	49·9
Robinson	90	19,125	19·2	D	186	39,141	39·3	191	35,378	23·3
Simmer & Jack	122	19,592	13·0	D	250	40,075	27·7	242	38,833	25·8
Sub Nigel	64	21,121	94·2	J	530	175,585	803·6	526	181,174	918·1
Venterspost	106	24,963	58·9	J	842	197,709	456·7	814	189,528	488·3
Vlakfontein	37	13,170	69·1	D	75	26,718	142·1	71	26,012	140·1
Vogels	102	25,543	105·9	D	201	50,804	213·0	182	46,187	182·2
West Drie	45	34,335	279·7	J	357	261,290	2108·9	227	149,144	1130·8
Anglo American*										
Brakpan	102	17,804	10·8	D	216	37,821	34·3	219	39,145	31·6
Daggas	206	48,138	290·3	D	417	97,555	594·2	436	103,214	678·5
East Daggas	91	15,472	46·0	D	185	31,471	93·3	171	29,911	94·0
S.A. Lands	94	17,309	48·3	D	193	35,540	101·7	199	36,066	105·8
Springs	126	17,676	7·6	D	257	36,144	17·0	292	40,463	23·3
Welkom	58	12,075	L 2·4	D	118	24,032	L 8·3	107	20,971	24·6
Western Hldgs.	47	14,856	45·1	D	95	29,369	90·1	—	—	—
West Reef Ex.	108	21,623	62·5	D	217	43,281	128·2	209	43,141	162·2
Central Mining										
Blyvoor	88	51,262	395·6	J	778	458,989	3720·7	823	496,949	4236·9
City Deep	150	29,389	18·1	D	315	60,902	38·3	308	60,841	50·2
Cons. M.R.	144	21,506	18·1	J	1311	184,580	156·9	1423	199,336	200·9
Crown	247	40,820	45·1	D	509	83,072	93·5	505	82,154	75·7
D. Roodepoort	160	26,399	39·9	D	335	54,916	89·6	349	59,882	153·0
East Rand Prop.	175	40,158	100·1	D	364	83,534	222·6	360	78,722	193·0
Modder B.	55	5,535	2·5	D	111	11,332	5·6	102	11,569	3·9
Modder East	105	12,048	12·5	J	900	103,135	108·6	922	106,412	169·4
Rose Deep	62	9,617	9·7	D	128	19,849	23·0	141	20,685	9·0
Welgedacht	31	3,706	1·8	J	267	32,743	21·0	269	33,159	35·7
J.C.I.*										
E. Champ d'Or	21	2,284	L14·0	D	44	4,569	L 22·9	50	8,155	8·1
Freddies N. †	27	5,224	L13·8	D	54	10,225	L 33·2	—	—	—
Freddies S.†	34	5,212	L14·0	D	69	10,217	L 32·3	—	—	—
Govt. G.M.A.	236	31,001	30·0	D	490	63,421	60·0	480	64,328	120·2
New State‡	10	2,809	1·0	D	21	5,719	2·7	75	10,852	2·0
Randfontein	237	38,676	25·2	D	517	78,229	50·8	600	79,366	60·3
Union										
East Geduld	122	37,822	274·1	D	248	76,573	554·6	264	79,202	585·4
Geduld Prop.	83	13,401	21·2	D	173	28,119	46·7	198	30,218	61·6
Grootvlei	162	34,830	190·1	D	337	72,023	397·5	355	76,322	452·8
Marievale	60	15,281	64·5	D	122	30,973	131·7	114	28,393	125·9
St. Helena	73	16,133	49·4	D	150	32,724	98·6	119	23,738	32·1
Van Dyk	74	12,912	2·4	D	152	26,548	5·7	182	29,377	11·3
General Mining*										
S. Roodepoort	25	5,553	18·5	J	218	47,556	161·1	216	49,254	184·3
W. Rand Cons.§	202	26,218	156·5	D	417	54,508	327·9	442	62,556	201·4
Anglo Transvaal										
N. Klerksdorp	11	—	L 1·4	D	20	—	L 2·8	21	2,745	2·3
Rand Leases	157	26,911	23·0	J	1269	218,449	121·0	1393	235,364	394·3
Village M.R.	33	—	12·0	J	273	—	96·1	270	42,272	115·8
Others										
Ellaton Gld Mng	23	5,422	14·3	D	44	9,885	14·7	—	—	—
N. Kleinfontein	99	12,541	16·0	D	206	26,208	36·1	*208	27,008	57·0
Stilfontein	74	23,306	123·2	D	148	46,276	242·4	112	29,307	128·2
W. Nigel*	17	3,729	9·1	J	137	31,146	66·2	134	—	60·7

Notes.—Profit figures are in all cases figures of working profit excluding profit from sale of gold at premium prices. In cases of groups marked with an asterisk(*) profit includes sundry revenue. Profit figures preceded by L indicates a loss.
† Excluding development expenditure
‡ Mining operations ceased during the month
§ Including £150,000 from uranium sales in February

New State Areas after 36 years of operations announced that mining ceased during February.

Of the newer mines, Doornfontein and Stilfontein showed improved profits as did Ellaton Gold whose February working profit figure of £14,341 compared with a mere £457 in January, its first month of operation. St. Helena continued to improve its position despite a lower tonnage throughput and higher working costs, but Welkom again showed a small loss.

Cons. Mines Selection May Raise More Permanent Capital

In contrast to the profit and loss account figures of Consolidated Mines Selection Company for the calendar year 1953, the salient features of which are given in the table below, the consolidated profit and loss account figures, which take into account the results of its wholly owned subsidiary, Consolidated Mines (Investments) Ltd., gross revenue at £279,840 (£274,436) revealed an improvement of some £23,000 over the parent company's results which, presumably, reflects the subsidiary's share dealing activities during the year.

Year to Dec. 31	*Working Profit* £	*Taxation* £	*Net Profit* £	*Dividend* s. d.	*To Reserve* £	*Carry Forward* £
1953	236,600	73,114	163,486	2 6	20,787	43,081
1952	252,765	102,866	149,899	2 6	21,935	34,132

The group balance sheet records investments at cost amounting to £1,460,743 compared with a market value at the end of 1953 of £2,618,446. Unquoted investments at or below cost are shown at £98,511 (£238,053).

Yet the company's financial position is not unduly strong and although current assets at £552,792 exceeded current liabilities by £200,926, the company up to the end of last year had drawn on its bank facilities to the extent of £156,000. This unsatisfactory position was commented on by the chairman, Mr. A. C. Wilson, who said that while no major financing was contemplated the company was giving consideration to the matter of raising fresh permanent capital. This may take the form of a small offer to stockholders, he added, in order to render the company's position "more comfortable."

Always identified with the Orange Free State gold mines in which its direct financial interest is stated in the report as being 20.9 per cent of its total holdings, this interest is considerably extended by the company's investments in South African mining finance companies amounting to 55.3 per cent of its total holdings. Thus the company's dividend income will increase accordingly as these new producers enter the list of dividend payers; while in the immediate future, current conditions in the South African gold market point towards a profitable year of share dealing activities. Meeting, London, March 30.

Recent Activities of Some Australian Mining Companies

Our Australian correspondent recently submitted information on the activities of four Australian gold mining companies, notes on which are appended below.

Great Boulder Developing Well in Depth

Great Boulder Proprietary Gold Mines Ltd., Kalgoorlie, Western Australia, continue to develop well. Developments at depth are good, but considerable work is being done at shallow levels, where narrow orebodies appear to have been by-passed in early years. These minor lodes have contributed substantially to tonnage mined and also to ore reserves in recent years.

During the sixteen week period ended December 28 last, in development work at the 60 ft. level off the Main Shaft, the north drive has met ore assaying 25.8 dwt. gold per ton over 4½ ft.; at the 900 ft. level the south drive on Ten Lode averaged 11.7 dwt. over 6 ft. for a length of 70 ft.; and a north sub-level on the same lode disclosed ore assaying 10.6 dwt. over 5½ ft. for 53 ft.; winzing on the same lode from the 1,400 ft. level averaged 5.6 dwt. over 5½ ft. to a depth of 62 ft. At Edwards Shaft the 400 ft. level south drive on No. 1 East lode was in 5.7 dwt. ore, 6 ft. wide, for 62 ft. The deep level work from this shaft is particularly interesting; at the 2,950 ft. level, No. 8 north drive has shown 55 ft. of lode assaying 5.4 dwt. over 6 ft.; and at the 3,100 ft. level winzing on the east branch of Edwards lode has reached 82 ft. in ore worth 8.8 dwt. over 4½ ft., and the north drive on the Phantom lode, at the same level, had shown 82 ft. of ore assaying 5.7 dwt. over 6½ ft. High grade ore was exposed in a sub-level south drive at the 1,600 ft. level, 52 ft. of driving assaying 17.1 dwt. over a width of 7½ft.; at the 1,800 ft. level, 120 ft. of driving was in ore worth 6.5 dwt. over 5½ ft., and at the deepest level, 2,650 ft., 112 ft. was driven in ore assaying 5.6 dwt. over 6¼ ft.

Substantial economies have been made in mining and milling costs, and the new power plant will make a further important

cut in working expenses. A higher price for gold is vital for the future of Australian gold mining, but Great Boulder is in a good position to meet continually increasing costs, without affecting the economic grade of ore reserves for some time to come at the existing gold price.

Mount Isa Mines Loses 6 Weeks' Production

Six weeks' production of blister copper was lost by Mount Isa Mines Ltd., North Queensland, through the breakdown of the turbo blower at the copper smelter. Replacement parts were flown from the United States by a specially chartered aircraft, at a cost of £A10,000. Repairs have been made, and the smelter is again in operation. In the six months to December 31, 1953, the mine produced 10,235 tons of blister copper, which is more than a full year's output by any other Australian copper producer. Production from commencement of smelting to June 30, was 5,477 tons of blister copper. In the last six months of 1953, there was a decrease in production of silver-lead bullion and zinc concentrate compared with the six months' period to December 30, 1952. Comparative figures were: silver-lead bullion, 16,460 tons and 19,140 tons for the respective periods; and zinc concentrate, 20,418 tons and 23,368 tons. Development work is proceeding steadily on the large northern prospect and on other neighbouring areas, and progressive results point to an interesting and important future for Mount Isa.

Kalgoorlie Southern Drilling Results Encouraging

This company, in which Western Mining Corporation, and the Broken Hill mining companies are interested, is prospecting the country south of the Golden Mile, Kalgoorlie, for repetition at depth of the formations in which the Golden Mile orebodies occur. Five diamond drill bores have been put down, the deepest reaching a vertical depth of 5,600 ft. The two deepest bore holes intersected quartz dolerite greenstone, showing strong shearing, narrow lode shears with low gold values, and transverse quartz stringers, some with gold. No. 6 bore is in progress and has so far reached a depth of 732 ft., above which a shear zone with quartz veinlets was passed through. Results of drilling so far are regarded as quite encouraging.

Great Western Consolidated Disappoints

Returns from Great Western Consolidated at Bullfinch, Western Australia, continue to be disappointing and there has been a steady fall in grade of ore milled since commencement of operations, which it was hoped would be countered by an increase in tonnage of underground ore and a reduction in open cut tonnage. Rate of output has been increased to 32,000 tons per month, which is helping the cost position. Other leases in the group contain higher grade ore, and the policy is now to bring these into production and raise the grade of milling ore. Further geological mapping and study are in progress, and drilling is being carried out on the Pilot and Corinthian leases, lying to the south of the Bullfinch leases, which are being worked at present with a view to their development. In assaying the future of Great Western Consolidated, it should be noted that other properties developed by Western Mining Corporation have passed through a similar adverse phase, notably Central Norseman Gold Corporation and Gold Mines of Coolgardie, both of which have become high grade gold producers.

Burma Mines and Burma Corporation

In last week's issue under the heading, "Burma Corporation Reports Small Loss," it was stated that Burma Mines incurred a loss of £607 compared with a profit of £189 for the preceding eighteen months ended December 31, 1952. The foregoing text is correct and thus the title of the note in last week's issue should have read "Burma Mines Reports Small Loss." Indeed, Burma Corporation announced a profit for the December quarter of £50,685 which, together with the September quarter's profit of £49,582, brought the total working profit of the Corporation for the six months ended December 31 last to £100,267.

The essential fact is that Burma Mines is a holding company whose principal asset is its 3,159,730 fully-paid "B" shares of K.10 each in Burma Corporation (1951) Ltd., which is the operating company and the working profit of £50,685 achieved in the December quarter was, therefore, earned by the Burma Corporation and not Burma Mines.

Geita Gold To Revise Its Development Operations

The substantial increase in the tonnage throughput of Geita Gold during the year ended June 30, 1953, emminently satisfactory as it was, was not achieved without drawing on ore reserve blocks to the extent of nearly 90 per cent. This fact gives added importance to the statement in the technical advisers' report that in spite of the substantial increase in the development footage advanced during the year amounting to 5,635 ft. compared with 2,358 ft. in the preceding year, the development rate was not yet sufficient to maintain alike the ore reserve position and to carry out the exploratory programme envisaged.

Year to June 30	*Milled*	*Per Ton Milled*			*Capital Expenses*	*Ore Reserves*	
		Grade	*Yield*	*Cost**		*Tons*	*Grade*
	(tons)	*(dwt.)*	*(oz.)*	*s. d.*	*£*	*(000)*	*(dwt.)*
1953	252,000	2.93	36,885	35 11	47,866	1,240	4.0
1952	212,600	3.05	32,409	35 10	29,373	1,913	3.7

* Including development charges.

Nevertheless, New Consolidated Goldfields, the company's technical advisers, are taking steps to rectify this position and they have also stated that grade control is now being brought into effect in order to eliminate overmining, mining of unpayable ores and the dilution of broken rock with waste, thereby ensuring that a profitable grade of ore is sent to the mill.

Geita Gold Mining is a private company incorporated in Tanganyika, having an issued capital of £667,460 in shares of 5s. each of which 76.38 per cent is held by Kentan Gold Areas and 20 per cent by New Consolidated Goldfields.

Company Shorts

Vaal Reefs to Raise £3,500,000.—Vaal Reefs Exploration and Mining Company in a lengthy circular to shareholders containing, in addition, a map showing the company's lease area in relation to its neighbouring gold producers, has announced that the company's consulting engineers have recommended the provision of a reduction plant with an initial milling capacity of 65,000 tons per month to be extended soon thereafter to 75,000 tons per month. The simultaneous sinking of the No. 1 vertical and sub-vertical twin shafts has also been recommended. Having regard to the work already achieved, it is estimated that crushing of development rock will be possible by about the beginning of 1956 and that the milling of ore from stopes will begin before the end of that year. Further extensions to the reduction plant will, it is stated, be considered in due course.

The additional capital required to carry out these proposals, including a plant with a capacity of 75,000 tons per month, and repayment of the present temporary loan of £600,000, is not expected to exceed £8,000,000.

The directors consider that a portion of the finance required should be raised now, to effect which it has been decided to raise approximately £3,500,000 of new capital by the issue of further shares in the company. The number of new shares to be issued and the price will be determined at a later date. The company's flotation agreement grants to Western Reefs Exploration and to Anglo American Corporation certain preferment rights of subscription in the proposed share issue and in terms of this agreement £250,000 of the new capital will be offered for subscription to those companies at the price, per share, to be fixed for the issue. This offer will exhaust the preference subscription rights held by the two companies.

The consulting engineers consider that the uranium values obtained justify an application for the company to become a uranium producer and have recommended accordingly.
producer and have recommended accordingly.

Yukon Consolidated Announces Lower Net Profits.—The Yukon Consolidated Gold Corporation experienced some of the worst digging conditions in its history during 1953. Additionally, the labour situation did not show an improvement over the previous year so that the combined throughput of its fleet of dredges showed a decline, the impact of which is reflected in the provisional profit figure for 1953 which showed a net profit, after providing for all charges of $23,000 compared with a net profit of $64,459 in 1952.

The company has announced that it has made an arrangement with the Consolidated Zinc Corporation of Canada (a subsidiary of the Consolidated Zinc Corporation) for an association in the field of base metal exploration in Canada.

Camborne School of Mines will hold their annual students' dinner at Tonkin's Restaurant, Camborne, on Thursday, March 25, at 7.30 p.m. for 8 p.m.

MINING ENGINEER WANTED

Qualified and experienced Mining Engineer required for columbite (alluvial and eluvial), prospecting and mining in P.E.A. (Mozambique). Married accommodation available in full furnished house; healthy climate; 1st class passages, including family. Write, giving age, marital status, details of qualifications and experience and other conditions of employment to: Empresa Mineira Do Alto Ligonha (Sarl), P.O. Box 1152, Lourenco Marques (P.E.A.). All applications treated as confidential.

THE CHARTERED BANK OF INDIA, AUSTRALIA & CHINA

A CENTURY OF SERVICE

The One Hundredth Ordinary General Meeting of The Chartered Bank of India, Australia and China will be held in London on March 31.

The following is an abridgment of the statement by the Chairman, **Mr. V. A. Grantham,** circulated with the report and accounts for the year 1953.

The year 1953 was doubly auspicious for the Bank. By the happiest of coincidences the centenary of Queen Victoria's granting to the Bank a Royal Charter of Incorporation was celebrated in the coronation year of her great-great-granddaughter, Her Gracious Majesty Queen Elizabeth II. During the month of June British Commonwealth communities in the East held festivities in celebration of Her Majesty's coronation and many of the Bank's buildings were beflagged by day and illuminated by night. Later in the year our branch managers invited friends of the Bank to join them in commemorating the one hundredth anniversary of the foundation of the Bank. These functions evoked many public tributes to the services rendered by the Bank to trade and industry. We all have been deeply moved by the warmth of felicitations extended to the Bank, on the occasion of its centenary, by a very large number of banking and commercial institutions throughout the world. Charter Day, December 29, 1953, was commemorated in London by a Service of Thanksgiving held in St. Helen's Church, Bishopsgate, attended by the Court of Directors, the Head Office Executives and a large company of the Staff.

SATISFACTORY RESULTS

The summoning of the One Hundredth Annual General Meeting of the Stockholders might be regarded as affording an opportunity to speculate on the future of British banking in the East, but the temptation to do so is one which I must resist. In all the statements I have made to the Stockholders as Chairman, it has been emphasized that the Chartered Bank, established as it is throughout southern and south-eastern Asia and the Far East, has given many hostages to fortune and this is no less true at the present time. Two years ago I explained how policy and organization have been adapted to swiftly changing political conditions in the East, and I described the steps we have taken to preserve, so far as it lay in our power, the goodwill of the Bank in situations which had become revolutionary in character. The success which has attended our endeavours so far is reflected in the accounts which accompany this Statement and I must point out that the satisfactory results achieved have been largely due to the ability of the General Managers in London, the skill displayed by the Branch Managers in the East and the devotion to duty shown by the Bank's Staffs everywhere.

Compared with last year there is a reduction of approximately £21,000,000 in the total of the Bank's Balance Sheet. The smaller figure this year is mainly due to the continued fall which has taken place during the year in the world prices of the basic Eastern commodities. Although the total of the balance sheet is less than it was a year ago there has been no diminution of liquidity; in fact, the position is more liquid.

Last year we augmented the Bank's Reserve Fund by a transfer of £1,000,000 from Contingencies, subsequently capitalizing £500,000 of that amount. This year we have transferred a further £500,000 from Contingencies to Reserve Fund, thereby replacing the amount capitalized during the year and bringing our published Reserve Fund up to £5,000,000. We have been at pains, so far as is possible, to restore a reasonable relationship between our Issued Capital and Reserve Fund and the total of our Balance Sheet. Considered as a whole I submit that our accounts display a well-balance distribution of the Bank's resources.

The Net Profits for the year amount to £693,798, a decrease from those of last year of £4,984. I have referred in recent years to the general deterioration in working conditions in almost every Eastern country in which the Bank operates and have stated that it would be foolhardy not to be prepared for some reduction in profits. These conditions have persisted during 1953 and there has also been a further rise in working costs. In the circumstances, therefore, I trust that the results achieved will be regarded as very satisfactory.

We paid an interim dividend in October last of 7% less Income Tax, absorbing £134,750, and it is proposed that, out of the balance now available, a final dividend of 7% less Income Tax, should be paid, costing £134,750, making the total distribution for 1953 14%. These dividends are paid upon an increased capital. It is proposed to transfer £75,000 to Contingencies account and to carry forward to next year the slightly increased balance of £403,513.

I felt bound last year to preface my review of the various countries in which the Bank operates in somewhat pessimistic vein, and in dealing with the Profit and Loss account I have again referred to a deterioration in working conditions in almost every Eastern country, which has been accompanied by a further rise in working costs. Let me make it plain therefore that notwithstanding these factors I think we can regard the future with rather more hope than we did when I last addressed you.

In certain countries the economic outlook is undoubtedly better. In others there is a more settled political outlook. Some countries have still a very difficult road to travel but they may have passed through the worst of the storm. It is the position of Japan that causes me more concern than that of any other country for it is well to recognize that her well-being is vital to South East Asia as a whole.

Speaking very generally I think we may all have to work harder for less profit but I believe that the possibilities of making profits, even if smaller profits, are more assured than they were. We must always be prepared for the natural emergence of nationalism but on the whole those countries in which we work are realistic in their outlook and we can be grateful for the friendly relationship that exists between us and their governments.

The improvement in the security situation in Malaya, which I mentioned last year, has continued, and the measures instituted by General Templer during his term of office as High Commissioner for the Federation have been successful in keeping the terrorists well on the defensive. Nevertheless the end of the Emergency is still not in sight and any slackening of the security measures in force would soon be followed by a renewed outburst of terrorist activity. Banditry has been checked along the coastal plain but is still active inland.

Malaya's output of tin at 56,254 tons last year was only slightly lower than in 1952, but exports fell from 64,117 tons to 61,753 tons. Between April and July, 1953, the price fell by over £350 per ton although it recovered to a certain extent later in the year. Prospects of an armistice in Korea and the announcement that the Reconstruction Finance Corporation, which largely determines United States purchasing policy in respect of tin, was to go out of business in June, 1954, helped to weaken the markets and it followed that there was support for a plan to create a buffer stock to stabilize the tin market. The draft scheme provides for a buffer stock of 15,000 tons in metal or its equivalent in cash to be expanded if necessary to 25,000 tons. Producing countries are allotted quotas according to their output, and export control will come into operation when the buffer stock reaches 10,000 tons.

PROBLEM OF CONVERTIBILITY

In my annual statements I have frequently referred to the question of convertibility of sterling, and while insisting upon the need for Great Britain, as banker to the sterling area, to restore full convertibility I have advocated caution in any approach to the problem.

Great Britain has heavy internal liabilities and heavy external responsibilities, and these external responsibilities in particular compel us to think very carefully before taking the next step. If we had no such responsibilities we could afford to take greater risks, knowing full well that as failure would end in inflation of the currency in this country, the penalty for failure would be borne by ourselves. But as bankers to the sterling area we cannot risk the credit of our friends who bank with us, and we certainly dare not gamble on the possibility of inflation in this country being acceptable to other countries within the sterling area that are faced with conditions quite different from our own. So, though the truth may be unpalatable, we must realize that unless our own position is assured, we cannot afford to take risks that will involve others, and for our own position to be assured we must have a substantial surplus on our balance of payments and be able to put into the common fund as much as we take out of it.

It goes without saying that we all require a steady growth of world trade and world investment, and that we shall not fully get this until we have a proper system of free and stable exchanges, first and foremost amongst which must be a stable and convertible sterling, and it is all to the good that we have seen in this country some reduction in taxation and a considerable step towards freedom from controls, both of which factors must help to encourage that private enterprise and those private savings, without which we cannot hope to restore our position in the world. We must have the full co-operation of the U.S.A. in any steps that we take towards convertibility, and while the report of the Randall Commission shows that our friends in America are fully alive to our needs, it also shows that we are not likely to get a quick remedy for our trouble from that quarter. Nor, as I said last year, do I feel that it would be easy to apply convertibility to so-called current sterling only. The next step may well be a determined effort to restore greater freedom of exchange within the sterling area.

The Chartered Bank of India, Australia and China

(INCORPORATED BY ROYAL CHARTER, 1853)

CAPITAL, STOCK, Authorised and Issued - - - - - - - - - £3,500,000
RESERVE FUND - - - - - - - - - - - - £5,000,000
RESERVE LIABILITY of the STOCKHOLDERS - - - - - - - - - £3,500,000

Head Office : 38 BISHOPSGATE, E.C.2
West End Branch : 28 CHARLES II STREET, HAYMARKET, S.W.1
Manchester Branch : 52/54 MOSLEY STREET, MANCHESTER, 2
Liverpool Branch : 28 DERBY HOUSE, EXCHANGE BUILDINGS, LIVERPOOL, 2

BALANCE SHEET, 31st DECEMBER, 1953

	£	£	1952 £
CAPITAL—			
Stock authorised and issued .. .. (There is under the Charter a reserve liability of the Stockholders equal to the amount of Stock issued.)	3,500,000		3,000,000
RESERVE FUND	5,000,000		5,000,000
PROFIT AND LOSS ACCOUNT	403,513		399,215
		8,903,513	8,399,215
CURRENT AND OTHER ACCOUNTS, including Reserves for Contingencies, Taxation on profits to date and Exchange Adjustments	147,925,300		160,608,784
FIXED DEPOSITS	17,112,487		19,479,617
NOTES IN CIRCULATION against Security per contra	2,765,064		2,564,308
BILLS PAYABLE	925,985		1,372,229
DEPOSITS BY NOMINEE SUBSIDIARIES ..	381		381
DEPOSIT BY TRUSTEE SUBSIDIARY ..	10,448		13,042
PROPOSED FINAL DIVIDEND, less Income Tax	134,750		141,750
ACCEPTANCES, including undertakings to accept, on account of Customers ..	9,184,870		15,935,514
		178,059,285	200,115,625
		£186,962,798	£208,514,840

NOTES :—

(1) There are contingent liabilities on Bills rediscounted, £6,591,381 (1952, £3,061,868) (of which £5,338,603 has run off at 1st March, 1954) and commitments in respect of Confirmed Credits, Forward Exchange Contracts and Guarantees, including Guarantees to Government Departments in India in respect of which securities valued at £294,562 (1952, £184,570) have been deposited with the Reserve Bank of India.

(2) Contracts for outstanding capital expenditure on premises amount to approximately £365,000 (1952, £224,000).

(3) Assets and Liabilities in foreign currencies have been converted into sterling at approximately the rates of exchange ruling on 31st December, 1953.

(4) Under Part III of the Eighth Schedule to the Companies Act, 1948, the Bank is exempted from showing the aggregate amount of its reserves and the movements therein.

H. F. MORFORD, *Deputy Chief General Manager.*
D. STEWART, *General Manager.*
W. H. CARRICK, *Chief Accountant.*

	£	£	1952 £
CURRENT ASSETS—			
CASH IN HAND, AT CALL AND AT BANKERS		31,495,231	31,787,819
GOVERNMENT AND OTHER SECURITIES at Market Value—			
Quoted on London Stock Exchange	45,323,206		53,243,093
Quoted on Overseas Stock Exchanges	10,330,709		9,714,972
Dominion Government and other Securities at Local quotations ..	3,133,490		3,342,070
		58,787,405	66,300,135
HONGKONG GOVERNMENT CERTIFICATES OF INDEBTEDNESS for surrendered coin lodged against Note Issue	929,278		929,278
BRITISH GOVERNMENT SECURITIES at Market Value (Quoted on London Stock Exchange) lodged against Note Issue	1,750,000		1,741,250
		2,679,278	2,670,528
BILLS OF EXCHANGE, including United Kingdom, Colonial and Foreign Treasury Bills		11,234,845	15,110,157
ADVANCES TO CUSTOMERS AND OTHER ACCOUNTS		67,248,879	69,247,953
BALANCE OF REMITTANCES, DRAFTS, ETC., IN TRANSIT between Head Office, Branches and Agencies ..		3,587,086	4,832,865
LIABILITY OF CUSTOMERS FOR ACCEPTANCES, including undertakings to accept, per contra		9,184,870	15,935,514
		184,217,594	205,884,971
FIXED ASSETS—			
SUBSIDIARIES—Shareholdings at cost—			
Allahabad Bank, Limited—37,760 Ordinary Shares of Rs. 100 each of which 14,680 are fully paid and 23,080 are paid up to the extent of Rs. 50 per share	749,510		747,905
The Chartered Bank (Malaya) Trustee Limited—			
30,000 Shares of Straits $10 each, $5 paid	17,500		17,500
Nominee Companies	381		381
The net assets of the Nominee Companies amount to £381, represented by deposits with the Bank, per contra			
	767 391		765,786
BANK PREMISES AND FURNITURE, at cost less amounts written off ..	1,961,313		1,845,520
TRADE INVESTMENT, representing Property, at cost less amounts written off	16,500		18,563
		2,745,204	2,629,869
		£186,962,798	£208,514,840

V. A. GRANTHAM, *Chairman.*
J. L. MILNE, *Deputy Chairman.*
C. R. CHERRY, *Director.*

REPORT OF THE AUDITORS TO THE STOCKHOLDERS OF THE CHARTERED BANK OF INDIA, AUSTRALIA AND CHINA

We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit. In our opinion proper books of account have been kept by the bank so far as appears from our examination of those books, and proper returns adequate for the purposes of our audit have been received from the branches, which have not been visited by us. We have examined the annexed balance sheet and profit and loss account of The Chartered Bank of India, Australia and China, which are in agreement with the books of account and returns as aforesaid. In our opinion and to the best of our information and according to the explanations given to us the said accounts give the information required by the Companies Act, 1948, in the manner so required for banking companies, and, on the basis indicated in Note (4) on the balance sheet, such balance sheet gives a true and fair view of the state of the bank's affairs as at 31st December, 1953, and the profit and loss account gives a true and fair view of the profit for the year ended on that date.

We have also examined the annexed accounts of the subsidiaries, Allahabad Bank, Limited and The Chartered Bank (Malaya) Trustee Limited, which have not been audited by us. Subject thereto in our opinion such accounts have been properly prepared in accordance with the provisions of the Companies Act, 1948, so as, in conjunction with the accounts of the bank as audited by us (which include particulars regarding Nominee Companies), to give on the basis mentioned above a true and fair view of the state of affairs as at 31st December, 1953, and of the profit for the year ended on that date of the bank and its subsidiaries so far as concerns stockholders of The Chartered Bank of India, Australia and China.

London, 3rd March, 1954.

DELOITTE, PLENDER, GRIFFITHS & CO.
W. A. BROWNE & CO. } *Auditors, Chartered Accountants.*

Profit and Loss Account for the year ended 31st December, 1953

	£	£	1952 £
ALLOCATIONS—			
Amount written off Bank Premises	200,000		200,000
Officers' Pension Fund	125,000		125,000
Widows' and Orphans' Fund	20,000		20,000
Contingencies Account	75,000		100,000
		420,000	445,000
DIVIDENDS PAID AND PROPOSED, less Income Tax—			
Interim 7% paid 2nd October, 1953 ..	134,750		110,250
Final 7% proposed	134,750		110,250
14%		269,500	220,500
Centenary Bonus of 2%		—	31,500
BALANCE PROPOSED TO BE CARRIED FORWARD		403,513	399,215
		£1,093,013	£1,096,215

	£	1952 £
BALANCE BROUGHT FORWARD FROM 31ST DECEMBER, 1952	399,215	397,433
PROFIT, after providing for taxation and after making allocations to Contingency Accounts, out of which Accounts full provision has been made for diminution in value of assets	693,798	698,782
	£1,093,013	£1,096,215

NOTES :—

(1) The aggregate emoluments received by the Directors for their services amounted to £19,456 (1952, £19,050). In addition pensions aggregating £1,250 (1952, £454) were paid to former Directors.

(2) The nominee subsidiaries do not trade and their accounts show neither profit nor loss.

THE CONSOLIDATED MINES SELECTION COMPANY

PROGRESS OF O.F.S. INTERESTS

The following is an extract from the statement by the chairman, **Mr. A. C. Wilson,** circulated with the report and accounts for 1953:—

Since the end of the war this company has, for its size, played quite an important role in the enormous development programme undertaken by the Anglo American Corporation of South Africa, Ltd., group. Our shareholding in Anglo American has for very many years been our most important single investment and, consequently, it has been the policy of your Board to do all in its power to assist in bringing the group's varied enterprises to successful fruition.

Now that the new mines, particularly those in the Orange Free State, are producing or nearing the production stage and are beginning to be recognized as an important factor, not only in the future economy of South Africa but the whole sterling area, stockholders can look back upon their contribution to these great developments with justifiable pride.

Even now some further time must elapse before rewards in the form of regular dividends are reaped. However, it can, I think, be said that the major problem of finding capital for these new mines has been successfully solved, and already profits are beginning to flow in on a rising scale.

FINANCE

Although our overall balance of "current assets" over "current liabilities" amounts to £200,000, at the year end we had drawn on our bank facilities to the extent of £156,000. Bearing in mind that during a period of great expansion we have not raised any additional permanent finance, I do not think that this position is unsatisfactory, but your Board is giving consideration to the matter of fresh permanent capital. No major financing is contemplated, but it may be decided to make a small offer to stockholders to render our position rather more comfortable.

For once in a way the poor share markets experienced in 1953 have proved a double blessing to this company—you will see that our liability to Excess Profits Levy is only £4,600. This figure might well have been considerably more because any profits in excess of those actually earned during the year under review would have attracted tax at a penal rate. However, share prices in 1953 were not such as to encourage your Board to be sellers. As a result we decided to hold on for better prices, thereby reducing our tax liability and at the same time reaping the benefit of the sharp all-round appreciation which has occurred since the end of last year.

It is, I think, reasonable to expect that our income from our investment in the Far West Rand and Klerksdorp areas will show a gradual improvement and that we shall, before long, start to receive dividends from our Orange Free State interests. Against this one must set the possibility of some recession in commodities which might adversely affect the profits of copper and diamond mining. However, the operating companies in these fields have been distributing considerably less than their total earnings and to this extent the repercussions of any setback should be cushioned. Generally the spread of our investment gives us reason to face the future with confidence.

EXTRACTS FROM DIRECTORS' REPORT

The following extracts are taken from the directors' report:—

The consolidated results of the company and its wholly-owned subsidiary show:—

1952		1953
£		£
253,843	Profits before taxation	258,729
103,937	Taxation (excluding adjustments in respect of previous years)	120,267
149,906		138,462
128,125	Net dividend and bonus (including directors' additional remuneration)	133,750

Quoted investments of the company and its subsidiary had a market value at the date of the consolidated balance-sheet of £2,831,420, compared with the book value of £1,592,404.

The disposition of quoted investments based on market values ruling at December 31, 1953, was as follows:—

	%
South African Mining Finance Companies	55.3
Orange Free State Gold Mining Industry	20.9
Other South African Gold Mines	2.9
Northern Rhodesian Base Metal Interests	17.3
Miscellaneous companies	3.6
	100.0

PETALING TIN, LIMITED

The Twenty-eighth Annual General Meeting was held in Ipoh on Tuesday, March 9, 1954, **Mr. J. T. Chappel, C.B.E., M.I.M.M.,** the Chairman presiding.

The following are extracts from his circulated statement to shareholders:—

The company's net profit for the year ended October 31, 1953, after reserving $1,066,000 (£124,367) for taxation, was $2,413,480 (£281,572), the fall in the profit compared with the very high returns of recent years being mainly due to the much lower average tin price. Interim dividends of 60 per cent were declared and a final of 10 per cent is proposed; if this is approved the balance to be carried forward will be increased by $257,480 (£30,038) to $993,959 (£115,961).

Although there has been a general improvement in the security position in the Federation during the past year, the end of the emergency, now in its sixth year, is not yet in sight, and recent incidents have shown the necessity for the continued maintenance of adequate security precautions. The 12-hour curfew, which was in force over a large portion of the property throughout the year, caused considerable inconvenience to the staff and labour force, and once again I would express appreciation of their continued efficient services under the prevailing difficult conditions.

While congratulating Sir Gerald Templar on his transfer to a high military appointment, it is much regretted that the Federation will lose his outstanding leadership at this stage. It is fortunate, however, that Sir Donald MacGillivray, who succeeds him as High Commissioner in June, has during the past two years obtained much experience of Malaya's problems, and shown himself to be an efficient, sympathetic and energetic administrator.

TIN METAL PRICE

The serious break in the tin metal price, which developed in April last year, was followed by a rapid decline until the low level of £567 per ton was quoted in the Singapore market in July and August. Since then there has been some recovery, but the future price trend is very uncertain, and much will depend upon the results of the consideration now being given by the Governments of consumer and producer countries to the International Tin Agreement, 1953, drafted at the Conference held in Geneva last November.

At the recent meeting of the Federal Legislative Council it was resolved that Her Majesty's Government should be requested to sign the Agreement on behalf of the Federation, after a substantial majority of the industry had expressed itself in favour of this course in a referendum taken by Government on a production basis. Provided the requisite number of other consumer and producer countries ratify the Agreement, it can come into force without acceptance by the United States, but it is clear that without American goodwill and support the scheme cannot function in view of that country's predominant position as the world's largest consumer of tin.

Thus Malaya is now committed to participation in the Agreement in the event of its ratification, and a Committee has been set up, on which all sections of the industry are represented, to consider the domestic arrangements for its implementation and to prepare drafts of such legislation as will be required in the event of the Agreement coming into force. It will be the primary duty of this Committee to ensure that the internal arrangements do not adversely affect the maintenance of Malaya's long-term position as the premier world producer of tin. Such questions as the method of the initial assessment and periodical re-assessment of the large number of producers in Malaya, arrangements for the production of the country's permissible exports, and provision for the encouragement of prospecting and development require very careful consideration in the light of the experience gained during the operation of the pre-war International Tin Control Agreements in force from 1931 to 1942.

While a considerable reduction from the high level of returns in recent years must be expected under present circumstances, your company with its substantial financial reserves, its three operative dredges, and large reserves of mining land, is well placed to meet any foreseeable circumstances which may arise.

The Chairman announced the declaration of a first quarterly interim dividend of 7½ per cent.

The Report and Accounts were adopted.

DIVIDENDS

British South Africa Co. 36¼% (April 3)
Tronoh Mines 9d. *i* (March 26)
Verceniging Estates 20% (March 20)
Zambesi Exploring 11% (March 23)
i interim

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Fraser & Chalmers Eng'g Wks.
Wilfley Mining Machinery Co. Ltd.

PUMPS — SINKING
Thom (John) Ltd.

RAILWAY PLANT & EQUIPMENT
Ward (Thos. W.) Ltd.

RESPIRATORS
Siebe Gorman & Co. Ltd.

RUBBER PRODUCTS
British Tyre & Rubber Co. Ltd.
Goodyear Tyre & Rubber Co. (G.B.) Ltd.

SAFETY EQUIPMENT
Malcolm Campbell (Plastics) Ltd.
Safety Products Ltd.
Siebe Gorman & Co. Ltd.

SCRAP SHEARS
Morrison Marshall & Hill Ltd.

SCRAPER HAULAGE
Austin Hopkinson & Co. Ltd.
Holman Bros. Ltd.
Wood (Hugh) & Co. Ltd.

SCRAPER LOADERS
Joy-Sullivan Ltd.

SCREENING PLANT
Davies Magnet Wks. Ltd.
Fraser & Chalmers Eng'g Wks.

SHAFT SINKING
Cementation Co. Ltd.

SHOVEL LOADERS
Joy-Sullivan Ltd.

STEEL FITMENTS
Steel Equipment Co. Ltd.

SURVEYING INSTRUMENTS
Hilger & Watts Ltd.

THICKENERS
Denver Equipment Co. Ltd.

TIMBER PRESERVATIVES
Hicksons Timber Impregnation Co. (G.B.) Ltd.

TRANSFORMERS
British Thomson-Houston Co. Ltd.
English Electric Co. Ltd.
General Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.

TUBE MILL LINERS
Hadfields Ltd.

TURBINES — STEAM
Richardsons Westgarth (H'pool) Ltd.

VENTILATING FANS
Howden (James) & Co. (Land) Ltd.

VEE-ROPE DRIVES
Wigglesworth (F.) & Co. Ltd.

WAGONS
Butterley Co. Ltd.

WATER SUPPLY EQUIPMENT
Thom (John) Ltd.

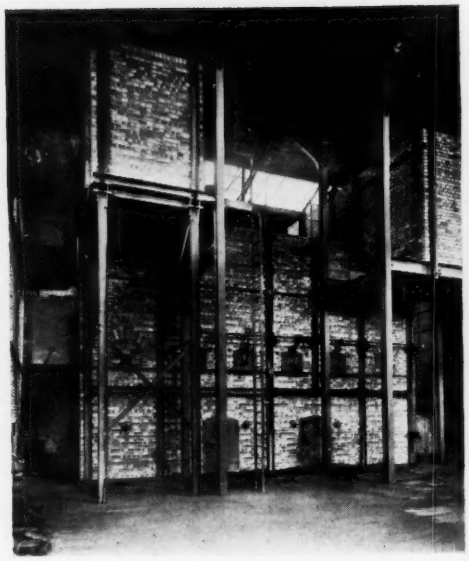
WELDING
Cementation Co. Ltd.

WELDING ELECTRODES
Metropolitan-Vickers Electrical Co. Ltd.

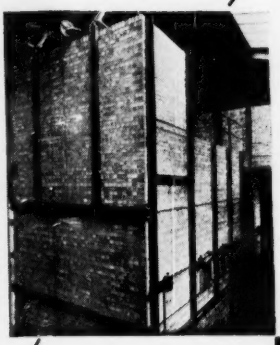
WELDING EQUIPMENT
British Insulated Callender's Cables Ltd.
English Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Siemens-Schuckert (G.B.) Ltd.

WIRE ROPE & ACCESSORIES
British Ropes Ltd.

WINDING EQUIPMENT — ELECTRIC
British Thomson-Houston Co. Ltd.
English Electric Co. Ltd.
Fraser & Chalmers Eng'g Wks.
Metropolitan-Vickers Electrical Co. Ltd.



780,000 cubic feet of gas cleaned per hour



Installed in S.E. England, this plant cleans, with a guaranteed efficiency of 98%, the hot SO_2 Gases from a Pyrites Roaster

The Gases pass through four banks of Electrodes

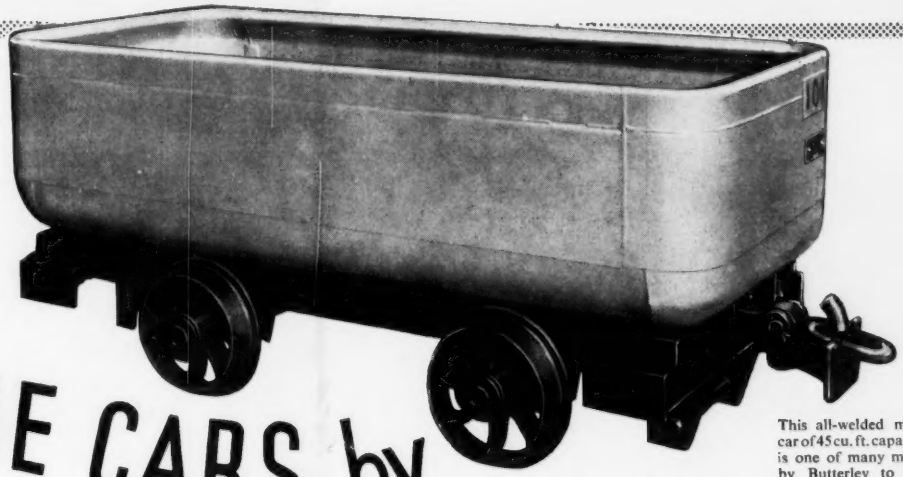
Pressure Drop through plant less than 0.25" w.g.

Power Consumption between 3.5 kw and 4 kw.

LODGE COTTRELL

Plants supplied for the precipitation of dusts, fumes. mists, tar etc

LODGE-COTTRELL LTD GEORGE STREET PARADE BIRMINGHAM 3 PHONE CENTRAL 7714 PIONEERS & SPECIALISTS IN ELECTRICAL PRECIPITATION



MINE CARS by BUTTERLEY

This all-welded mine car of 45 cu. ft. capacity is one of many made by Butterley to the latest N.C.B. specification.

FOUNDED 1790

THE BUTTERLEY COMPANY LIMITED · RIPLEY · DERBY · ENGLAND

LONDON OFFICE: 20 ASHLEY PLACE · VICTORIA · S.W.1

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